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1958

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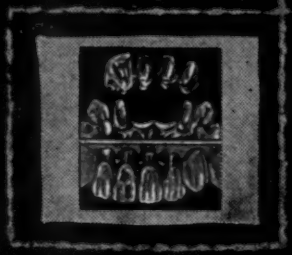

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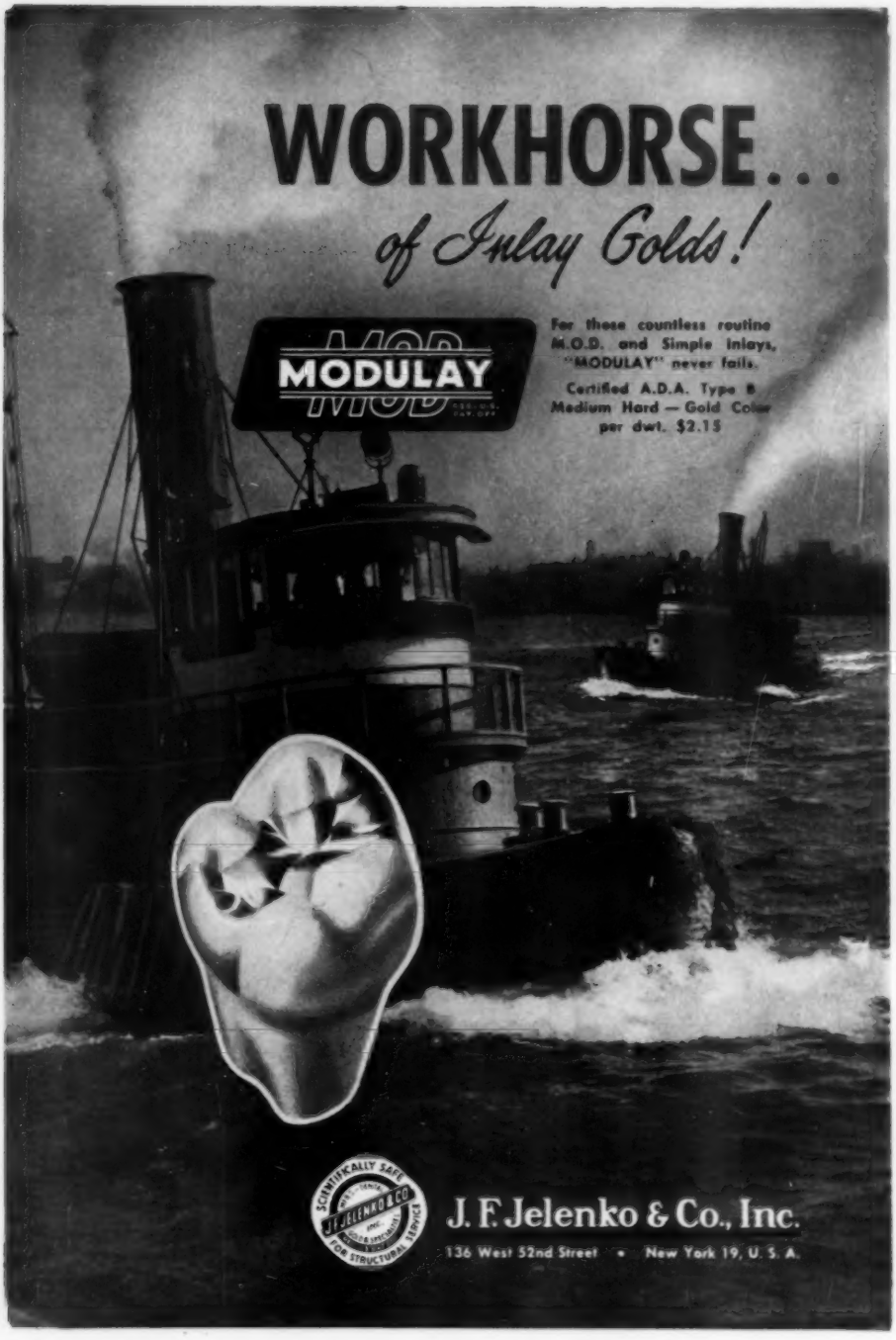
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1. Shaw, J.H.: Nutrition and Dental Caries, J.A.M.A. *166*:633 (Feb. 8) 1958.
2. Elvehjem, C.A.: A Nutritionist's View of the Caries Problem, J. Am. Dent. A. *37*:410 (Oct.) 1948.
3. Joint Report of the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association, J. Am. Dent. A. *47*:387 (Oct.) 1952.

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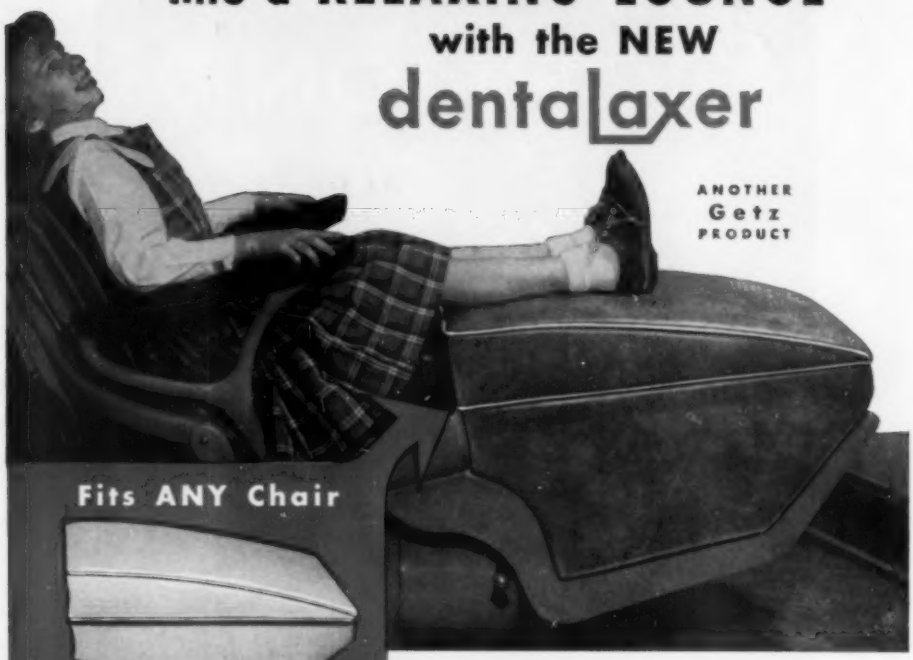

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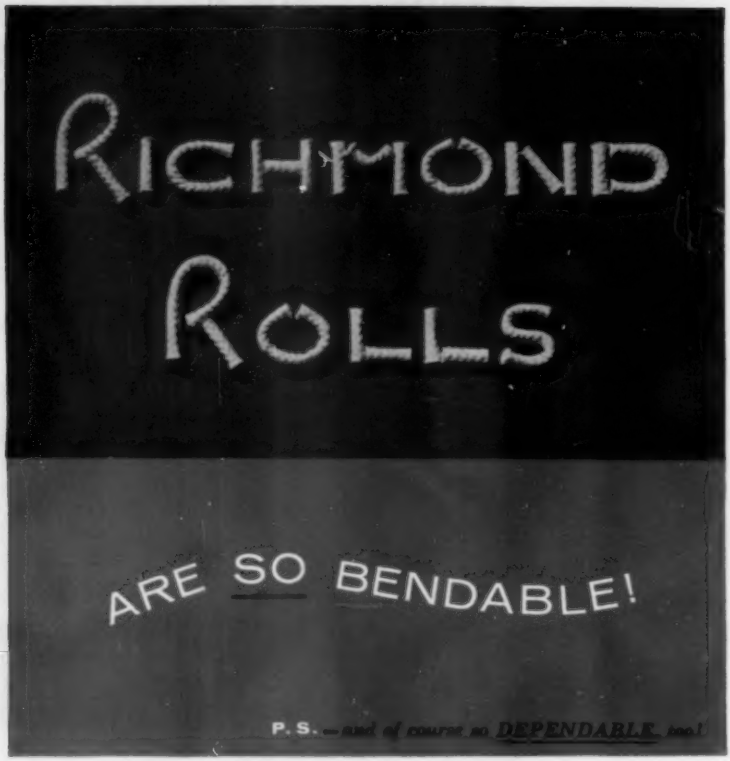

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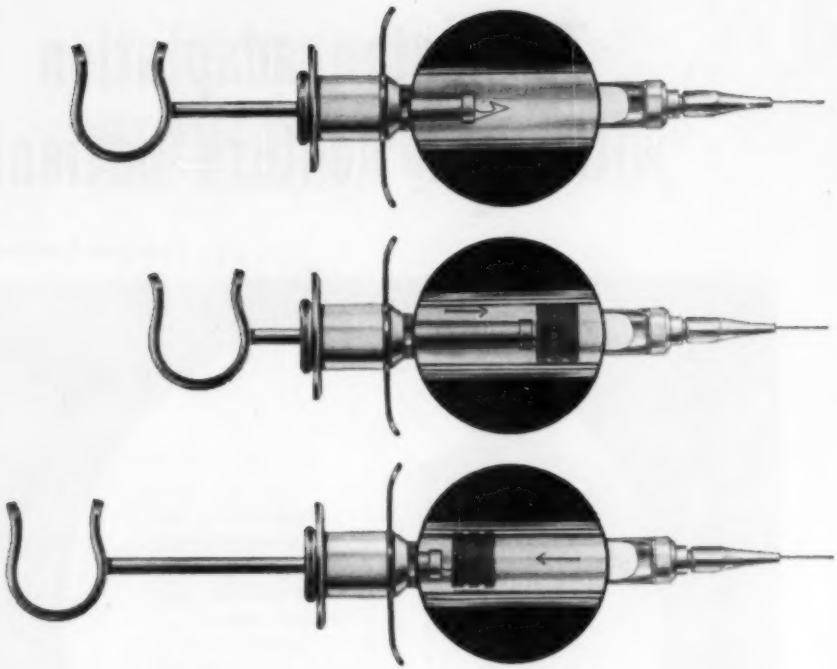

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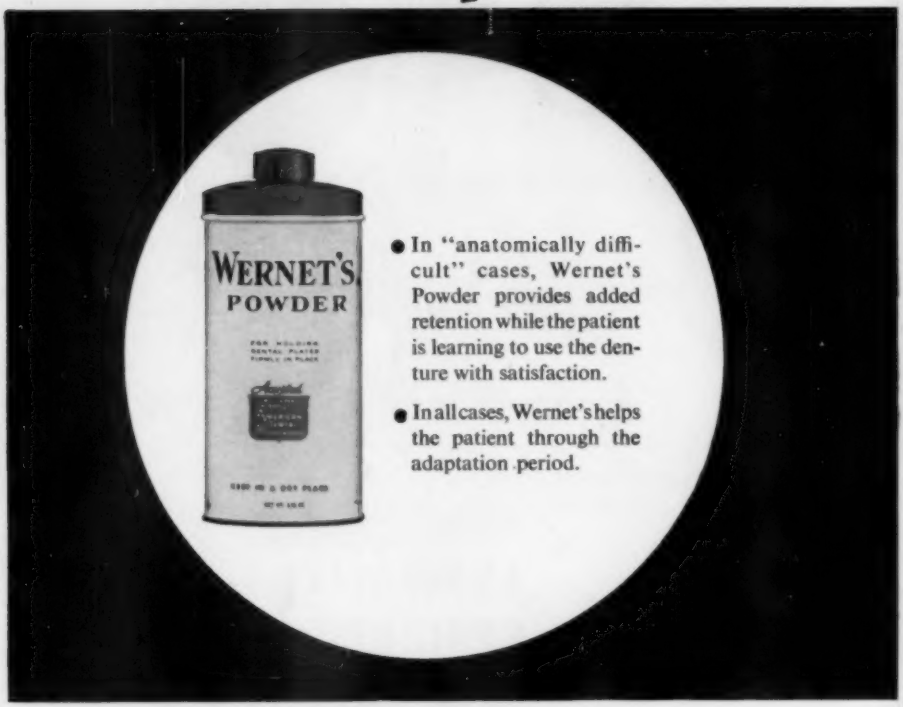

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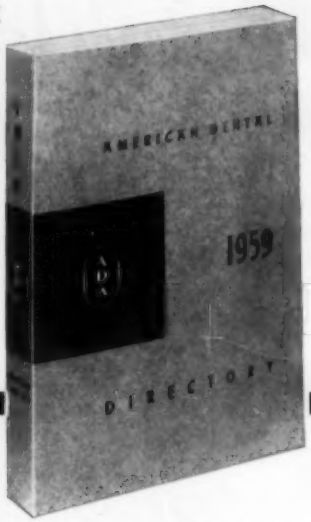

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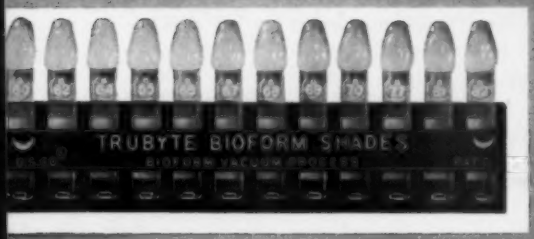

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An evaluation of mechanical instrumentation and the negative culture in endodontic therapy

John I. Ingle, D.D.S., M.S.D., and*
Bernard J. Zeldow,† D.D.S., M.S., Seattle

In addition to proper selection of teeth for treatment, successful root canal therapy depends on the satisfactory completion of the endodontic triad—canal enlargement, canal "sterilization" and canal obturation.[1] It seems unreasonable to place particular emphasis on any one of these requirements, since inadequate attention to any of the phases usually results in failure. Nonetheless, dental literature is replete with papers assigning greater importance to one division or the other of the triad.

The purpose of this paper is not to stress the significance of any particular endodontic procedure, but rather to evaluate the role of mechanical instrumentation in the reduction of the bacterial flora of the canal.

The methods employed in this investigation are not advocated for use in routine clinical treatment; these endodontic procedures were used only for the purpose of obtaining the information presented in this paper and in a subsequent one.

METHOD

All of the 89 teeth involved in the study had nonvital pulps which gave a negative response to the electric pulp tester, to heat and to cold. Only single canal teeth were chosen for the study. Some of the teeth were intact; however, a number of the canals were open to the oral environment by intention or because of

Research conducted under a grant made available by Washington State Public Law 171.

Presented before the American Association of Endodontists, Chicago, February 2, 1958.

*Associate professor and executive officer, department of periodontics and endodontics, University of Washington School of Dentistry.

†Instructor, department of periodontics and endodontics, University of Washington School of Dentistry.

1. Ingle, J. I. Root canal obturation. J.A.D.A. 53:47 July 1956.

BACTERIOLOGICAL CULTURE RESULTS	NUMBER TEETH	PERCENTAGE
Negative	24	27
Positive	65	73
Total	89	100

Fig. 1 • Bacterial status of 89 pulpless teeth as determined by bacterial cultures prior to treatment

caries. None of the patients selected for this study received antibiotic therapy within one month prior to or during the course of root canal treatment. All of the root canal therapy was performed by members of the endodontic staff of the University of Washington. In every instance the tooth to be treated was isolated under the rubber dam, and an aseptic regimen was followed throughout the treatment.

Initial Appointment • After the pulp chamber was opened and access gained to the canal, a pretreatment culture (CU 1) was taken with a sterile paper point delivered to or near the apex. The point was allowed to remain in the canal for one minute and was then used to inoculate the media. If the point was not moistened by the canal contents, the procedure was repeated with a paper point impregnated beforehand with the culture media. In addition, a dry paper point from the instrument case was placed in a separate culture tube to serve as a control (Control 1). The culture medium was brain-heart infusion broth, 5 milliliters in each 2 dram screw-cap vial. All cultures were incubated at 37° C. for 48 hours, this being the incubating time usually employed in routine office procedure.

After the initial culture was taken, the length of the canal was established and instrumentation with large reamers and files was begun.[2] Canal enlargement was accompanied by frequent irrigation with sterile distilled water.

After completion of mechanical instrumentation, apical filings were obtained by means of an unused sterile reamer of the last maximum instrument size. These filings were placed in a tube of broth and incubated (CU 2). Immediately the canal was again irrigated with water to remove the residual filings, dried, and another culture (CU 3) of the canal was made, adhering to the same procedure used initially. Finally, a sterile paper point was inserted entirely within the confines of the canal, a small cotton pellet was placed over the canal orifice, and the canal was completely sealed with oxyphosphate of zinc cement. Care was taken to adjust the temporary filling out of occlusion and to check the seal. The dam was removed and the patient dismissed to return in 48 hours for final treatment.

Final Appointment • After the rubber dam placement at the second appointment, the seal of the temporary filling was examined carefully to determine whether leakage had occurred. The aseptic technic was then reinstituted and a control culture of a paper point from the instrument case was repeated (Control 2). After the tooth was opened, the paper point inserted at the last visit was removed and cultured (CU 4). Immediately after this culture, a fresh paper point was inserted into the canal, left for one minute, and when moist, used to inoculate another culture tube (CU 5).

The procedure in this particular study was to obturate all the canals at the second appointment even though positive cultures might be obtained from the canal. The endodontic treatment was completed, therefore, at the second ap-

2. Ingle, J. I. Endodontic instruments and instrumentation. In Dental clinics of North America, November 1957. Philadelphia, W. B. Saunders Co., 1957, p. 805-822.

pointment for all the patients except those suffering from acute symptoms. This treatment consisted of adjusting the trial cone, drying the canal, and finally obturating the canal. Usually the multiple cone technic was used, although a few canals were filled with a single gutta-percha cone cemented into place.[1]

The patients treated by this two-appointment technic were examined periodically to determine the success or failure in those instances in which obviously infection was present at the time of obturation. The results of this portion of the study will be evaluated in a subsequent paper.

BACTERIOLOGICAL RESULTS

Pretreatment Cultures • In this particular study, the pretreatment bacteriological examination (CU 1) indicated that of the 89 teeth treated, 27 per cent yielded an initial negative culture (Fig. 1). Attention, however, will be focused on the remaining 65 teeth (73 per cent) which constitute the infected group.

Cultures at First Appointment • Immediately after mechanical instrumentation and sterile water irrigation, only 13 teeth, or 20 per cent of the 65 infected, demonstrated negative cultures; that is, both the cultures from the apical filings (CU 2) and from the canal (CU 3) failed to show bacterial growth (Fig. 2).

Cultures at Second Appointment • When the patient returned for the second appointment it was expected that in approximately the same number, 13, the cultures would be bacteriologically negative. Actually, however, 10 of these 13 which had had negative cultures proved to be positive in the 48 hour interim, leaving only three of the 65 infected teeth free of discernible bacterial growth at the end of 48 hours. In addition, the cultures of the remaining 52 infected teeth were consistently positive throughout therapy. Consequently, at the beginning of the second appointment it became apparent that 95.4 per cent of the infected teeth were still infected, and that only 4.6 per cent of these infected teeth yielded a negative culture from instrumentation and sterile water irrigation alone.

Probability of Error • An analysis of the results of this study reveals some highly significant data. At the first appointment, for instance, both the culture of the apical filings (CU 2) and the intracanal

BACTERIOLOGICAL CULTURE AFTER INSTRUMENTATION	NUMBER OF TEETH	PERCENTAGE OF INFECTED CASES
NEGATIVE (CU 2 and 3)	13	20.0
Remained Negative (CU 4 and 5)	3	4.6
Turned Positive (CU 4 and/or 5)	10	15.4
POSITIVE (CU 2 and/or 3)	52	80.0
Remained Positive (CU 4 and/or 5)	52	80.0
Total	65	100.0

Fig. 2 • Effect of instrumentation and sterile distilled water irrigation on bacteriological status of 65 infected pulpless teeth

culture immediately after (CU 3) were intended as a check on one another. It was found that in 15 instances, or 23 per cent of the infected teeth, there was variation in the results of these two cultures. Neither the apical filings nor the intracanal cultures, however, yielded a significantly greater number of positive cultures. Likewise, at the second appointment, 48 hours later, both cultures (CU 4 and CU 5) served as a check on each other. The only significant difference between these two cultures was the length of exposure of their contained paper points: 48 hours on the one hand and one minute on the other. In three of the 65 infected teeth (4.6 per cent), the results of these two cultures differed. (These results should not be confused with those obtained in the three teeth [4.6 per cent], the cultures of which remained consistently negative after instrumentation.)

It appears, therefore, that the culture technic after instrumentation and irrigation without medication of infected root canals is not infallible. The probability of error in intracanal culturing in depicting a true negative culture has been verified by others.[3, 4]

In contrast it is interesting to note that the original 24 uninfected teeth yielded consistently negative cultures throughout therapy. Moreover, had leakage of the temporary seal occurred in these instances, microorganisms would have contaminated the canal. The consistently negative cultures in this group speak for the dependability of the seal used throughout the investigation.

SYMPTOMS DURING TREATMENT

An accurate record was maintained of the patients' symptoms during treatment. The majority of the patients, 79 per cent, experienced no symptoms. The remaining 21 per cent experienced varying degrees of discomfort. About a third of the patients that experienced discomfort reported moderate complaints such as slight pain on pressure; another one third experienced severe pain and swelling. The sterile water therapy for these two groups was prolonged in order to learn if the body defenses would control the condition. After alleviation of the symptoms, the canals were obturated without antibacterial medication. The remaining third of the patients in distress, comprising about 8 per cent of the total number of patients, had such severe complaints and symptoms that it became necessary to utilize surgical and antibiotic therapy. Because of the use of antibiotics, this group was not included in the 89 instances reported on here.

DISCUSSION

The results of this study indicate that only a very small fraction (4.6 per cent) of the infected teeth yielded two successive growth-free cultures after mechanical instrumentation and irrigation with sterile distilled water. Conversely, the vast majority (95.4 per cent) of the initially infected teeth continued to yield a positive bacteriological culture 48 hours after mechanical instrumentation. Sterile distilled water does not have an antibacterial effect. The use of sterile water for irrigation undoubtedly explains the difference between these results and those obtained by Stewart,[5] who reported two successive negative cultures in approximately 76 per cent of the infected canals after chemomechanical preparation of the root canals in which 3 per cent hydrogen peroxide and sodium hypochlorite (Zonite) was used.

Stewart recognized the possible antibacterial role of the hydrogen peroxide

3. Bender, I. B., and Seltzer, S. Probability of error of the negative culture with the use of combinations of antibiotics in endodontic treatment. Oral Surg., Oral Med. & Oral Path. 7:1311 Dec. 1954.

4. Buchbinder, M., and Bartels, H. A. Criticism of the use of root canal cultures in evaluating antibiotic therapy. Oral Surg., Oral Med. & Oral Path. 4:886 July 1951.

5. Stewart, G. G. Importance of chemomechanical preparation of the root canal. Oral Surg., Oral Med. & Oral Path. 8:993 Sept. 1955.

and sodium hypochlorite. Auerbach,[6] reporting a similar clinical investigation, used double strength chlorinated soda as the irrigating solution. He attributed the 78 per cent growth-free cultures which he obtained solely to instrumentation of the infected teeth. Grossman[7] has criticized this interpretation and has emphasized the potential role of the irrigating drug. The study reported here strongly suggests an antibacterial action of the irrigating agents used by Stewart and by Auerbach.

This study indicates, also, that mechanical instrumentation does not render the root canal "sterile," although it may reduce temporarily the number of microorganisms. It remains for antibacterial medication to destroy the bacteria. The purposes of instrumentation are cleansing of the pulp chamber and root canal of tissue and its breakdown substances, removal of obstructions, enlargement of the canal so that it may receive a greater quantity of medication, and preparation of the canal to receive the filling material for complete obturation.[8]

Endodontists frequently use the term "sterilization of the root canal" and assume that two successive negative cultures indicate a sterile root canal. The term "sterile" implies that all the microorganisms are killed and does not allow for compromise; that is, a canal cannot be partially or relatively sterile.

Bender and Seltzer[3] discussed the probability of error of the negative culture when antibiotic combinations are employed. After the 48 hour incubation period, which is customarily used, they found 31 per cent false negative cultures. This figure decreased to 13 per cent if a seven day incubation period was employed. By eliminating the factor of medication in the study reported herein, we found only a 4.6 per cent minimum probability error of this technic to depict a true negative culture taken at a subsequent appointment and incubated for 48 hours. It seems valid to assume that this 4.6 per cent was due to the error introduced by virtue of sampling. If the paper point does not contact the organisms in the canal, or if too few bacteria are present in the inoculum, as may be the case immediately after instrumentation and irrigation, a false negative culture easily may be obtained. Moreover, the fact that the culture tube may be teeming with bacteria and yet not appear turbid to the eye must be recognized. As an illustration of this point, approximately 10^7 *Escherichia coli* (about twice the size of streptococci) must be present in each milliliter of broth to yield a discernible turbidity. This may account for the fact that often the apparently negative 48 hour cultures become positive on continued incubation. In addition, these two latter reasons may explain the higher percentage of negative cultures in this study immediately after instrumentation (20 per cent) than at the subsequent visit (4.6 per cent), and the high probability of error of cultures taken immediately after instrumentation and flushing (23 per cent). Also, it is well known that all microorganisms will not grow on the same medium. Although a medium is selected for use in endodontic practice which will support the growth of a large proportion of the bacterial flora,[9] it is obvious that an element of uncertainty exists. Fastidious organisms incapable of growing in the medium inoculated may be present in the canal and periapical region.[10, 11]

Re-evaluation of the significance of

6. Auerbach, M. B. Antibiotics vs. instrumentation in endodontics. New York State D.J. 19:225 May 1953.

7. Grossman, L. I. Antibiotics vs. instrumentation. A reply. New York State D.J. 19:409 Oct. 1953.

8. Grossman, L. I. Root canal therapy, ed. 4. Philadelphia, Lea & Febiger, 1955, p. 202-203.

9. Shay, D. E. Selection of a suitable medium for culturing root canals. J.D. Res. 26:327 Aug. 1947.

10. Brown, L. R., and Rudolf, C. E., Jr. Isolation and identification of microorganisms from unexposed canals of pulp-involved teeth. Oral Surg., Oral Med. & Oral Path. 10:1094 Oct. 1957.

11. Macdonald, J. B.; Hare, G. C., and Wood, A. W. S. Bacteriologic status of pulp chamber in intact teeth found to be nonvital following trauma. Oral Surg., Oral Med. & Oral Path. 10:318 March 1957.

the negative culture is in order as the negative culture does not necessarily imply sterility. Until more reliable technics are developed, it can be stated that in essence the bacterial phase is only controlled. The term "sanitization of the root canal" is suggested to define this situation more clearly.

By intracanal medication, the bacterial population of the root canal is greatly reduced and the natural defense mechanisms of the individual are able to function against less than overwhelming odds. Nevertheless, the culture technic coupled with sound clinical judgment still remains the most reliable method of determining the bacterial status of the root canal.

Critical evaluation indicates that a new interpretation of this phase of endodontic therapy is necessary. Because of the limitations discussed, the term "sterilization" in reference to the root canal should be discarded, although it still remains the ultimate goal.

SUMMARY

1. A series of 89 single-canal teeth with nonvital pulps were cultured prior to treatment. Sixty-five of these teeth (73 per cent) were found to be infected at the initial appointment. The remaining 24 teeth (27 per cent) yielded negative bacteriological cultures at the outset and remained negative throughout treatment.

2. Immediately after complete mechanical instrumentation and sterile distilled water irrigation, 13 of the 65 infected teeth (20 per cent) yielded a 48 hour negative culture.

3. At a subsequent appointment and without intervening intracanal medication, only 3 (4.6 per cent) of the original 65 infected teeth yielded two successive negative cultures; 95.4 per cent remained infected.

4. Mechanical instrumentation and irrigation with sterile distilled water proved to be a very inefficient method of sterilizing the root canal.

5. Without medication, the minimum probability error of the negative culture taken immediately after instrumentation and irrigation and incubated for 48 hours is approximately 23 per cent. At a subsequent appointment the minimum probability error for discriminating negative cultures decreases to 4.6 per cent.

6. The negative culture does not necessarily imply sterility of the root canal. Critical re-evaluation of the entire problem of the so-called "negative culture" and "sterile" root canal is needed.

Education and Progress • True education makes for inequality—the inequality of individuality: the inequality of success; the glorious inequality of talent and of genius. Because inequality and not mediocrity, individual superiority and not standardization are measures of the progress of the world. *Felix E. Schelling.*

Traumatic occlusion and occlusal equilibration

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Today the entire profession has become aware of the importance of occlusion and is demanding more information on the subject. As a result, many new concepts and thoughts have arisen—some good, some bad. Some clinicians and scientists have confused their followers because of their misconception of fundamental principles of occlusion. The original theories of the effects of traumatic occlusion on the dental apparatus are still valid. The means of obtaining occlusal equilibration may have been altered slightly. As early as 1925,[1] I stated that the success of periodontal treatment was due to (1) relief of traumatic occlusion and establishment of occlusal equilibration, (2) instruction in the correct use of the toothbrush, (3) proper scaling and prophylactic care, (4) talks on diet and (5) cooperation of the patient.

As understanding of traumatic occlusion has been reached, the profession has realized that correct occlusal equilibration requires less grinding than was previously supposed. Today as always, my procedures are conservative, suggesting less grinding rather than too much, and calling for the preservation of as much tooth structure as possible.[2-6] One of the difficulties seems to be the fact that many confuse the general ideal with the specific normal of the particular individual.

Each case must be considered on its own individual basis, since occlusion varies with age, stress and wear of the teeth. Wright[7] said:

> We as a profession are now concerned with the individual and his function, while averages and anatomic ideals are reserved for theoretical discussion. We now regard the individual with his peculiar dentition and related function as the criterion of dental treatment. . . . Each individual differs from another. It is therefore obligatory that we recognize these variations and accommodate them in order to provide functional, comfortable and health promoting dental treatment.

The aforementioned facts are important in any condition where occlusion contributes greatly to the breakdown of the periodontal tissues.

OCCLUSAL EQUILIBRATION

The terms involved in obtaining occlusal equilibration will be defined as they are used in this paper.[8]

Centric Relation • Centric relation is the most retruded position of the mandible

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1. Sorrin, Sidney. Periodontoclasia—a study in clinical observations. D. Digest 31:840 Dec. 1925.

2. Sorrin, Sidney, and Miller, S. C. Practice of periodontia. New York, Macmillan & Co., 1928.

3. Sorrin, Sidney. Traumatic occlusion. D. Items Interest 53:425 June 1931.

4. Sorrin, Sidney. Treatment of periodontal disease. Modern Den. 3:35 Oct. 1933.

5. Sorrin, Sidney. Traumatic occlusion: its detection and correction. D. Digest 40:170 May; 202 June 1934.

6. Sorrin, Sidney. Common errors regarding traumatic occlusion. D. Outlook 26:456 Oct. 1939.

7. Wright, Walter H. Part of a symposium on occlusion in dentistry. Columbia University, Feb. 17, 1950.

8. Miller, S. C. Textbook of periodontia (oral medicine), ed. 3. Philadelphia, The Blakiston Co., 1950.

at a certain degree of opening irrespective of teeth. This does not include the freeway or interocclusal space. Centric relation is essentially a prosthetic term designed to establish an intermaxillary relation for the setting up of teeth. When the mandible is at this most retruded position and at this ideal degree of opening for tooth contact, centric relation is said to prevail.

Centric Occlusion • Centric occlusion is the relationship of the jaws when the mandible is closed (essentially by simple hinge action) from its normal rest position to tooth contact. This is not the "most retruded position" of the mandible, which induces a feeling of strain and compression in the temporomandibular region. Maximum tooth contact exists or should exist in this position. The muscles of mastication function most efficiently at this level.

Physiological Rest Position • Physiological rest position is the intermaxillary relation when the mandible is at its usual resting level with the lips just making contact and the musculature relaxed. This position can be consciously approximated by asking the patient to wet the lips lightly with the tip of the tongue and slowly bring them together, or by saying M and holding it. This position can be simply recorded by exposing an 8 by 10 roentgenographic film held parallel to the side of the face (tube distance 36 inches). The freeway space or interocclusal rest space can be measured in this way.

Freeway Space • Freeway space or interocclusal rest space is the distance intervening between the opposing teeth at the normal rest position—usually 1.5 to 4 mm.

The importance of these concepts of centric occlusion, normal rest position, and freeway or interocclusal rest space cannot be emphasized too strongly.

Ideally, centric occlusion very closely approximates centric relation. After years of use and wear of the teeth, centric occlusion will shift anteriorly so that in time there may be as much as 1 mm. difference between centric relation and centric occlusion. When malocclusion is present, the mandible is often compelled to assume an unnatural position both in function and in its endeavor to achieve a resting position. When this occurs, temporomandibular joint disturbance and periodontal disease are often induced.

It is most important in registering the various movements of the jaw that the dentist determine what time of the day the patient is most relaxed. With some, it may be before going to work, with others, after work, with some, during the day. Unless the patient is relaxed, the registrations may be incorrect.

In the study of periodontal disease, traumatic occlusion is only one of the many factors which may be responsible for the breakdown of the supporting structures. This one factor, however, is closely related to all dental operations. Dentists are endeavoring to acquire a better understanding of it.

In correcting traumatic occlusion an attempt is made to establish occlusal equilibration. This is the ideal arrangement of the teeth, whereby stresses on all the teeth are innocuously distributed in any position of the jaw. Occlusal equilibration may be accomplished by orthodontics, restorations, grinding or a combination of these methods.[9]

Every tooth in the jaw is mechanically arranged to tolerate normal forces. Each tooth or group of teeth is shaped to perform a definite function in mastication. When the occlusal force applied is in equilibrium with the resisting forces of the periodontium, a physiologic occlusion exists. One of the most important factors

9. Sorrin, Sidney. Comparison between grinding of occlusion of natural teeth and artificial dentures. New York J. Den. 16:345 Nov. 1946.

upsetting this ideal relationship is traumatic occlusion. This condition exists not only when injury has already resulted, but also when there is a potential possibility that injury may result.

Too often, as a result of misconceptions in the theory and practice of occlusal equilibration, occlusal grinding is criticized unjustly. In grinding, the objective is to relieve traumatic occlusion and to establish better function. This is obtained in all functional relationships of the teeth by (1) preliminary grinding, (2) eliminating interceptive contacts, (3) securing simultaneous contact so that the load may be distributed over as many teeth as possible. Often a tooth which seems to be in good relation in centric occlusion is subjected to strain when the jaw moves into an eccentric position. Sooner or later it will show signs of traumatic occlusion, for it cannot alone perform functions intended for many more teeth. A brief outline of the procedure in obtaining occlusal equilibration follows:

Procedures • After casts, charting, and roentgenographic examination have been made, the various movements of the jaw are examined and the following noted:

1. Whether this is an instance in which complete mouth reconstruction is required because of loss of vertical dimension or other factors.

2. Whether orthodontic interference would best be advised.

3. Whether selective grinding can accomplish the desired result.

4. Whether a combination of these factors would be the best treatment.[10]

If grinding is the procedure of choice, the following is considered:

1. Preliminary grinding. This is a procedure whereby food impactions are relieved, facets and premature wear are reduced, and esthetics and the patient's biting habits are studied. The operator should be careful in all grinding processes not to interfere with esthetics and phonetics or to induce sensitiveness. The amount of grinding which can be accomplished on natural teeth is limited.

2. The next step is to check, in order, centric occlusion, protrusive position and excursion and lateral excursions of the jaw. When grinding is done for any position, it is essential to check for possible disturbance of an equally important contact in another position of the jaw. Thus, objectives to be obtained in all positions of the jaw must be understood clearly.

In natural teeth, centric occlusion may or may not be in harmony with centric relation. By means of selective grinding, using pink wax, articulation paper, the patient's awareness of points of contact, visual examination, roentgenographic examination, mounted study casts, traumatogenic lesions on soft tissues, and sound on closure of the jaws as guides, interceptive contacts which prevent correct closure in this position are reduced.

In recent years, I have employed blue or green casting wax, gauge 28, to aid in locating interceptive contacts. The wax is contoured over the teeth on left and right sides and the patient is requested to close lightly until the first point of contact is felt. The wax is then chilled and removed. Interceptive contacts are easily discernible by holding the wax up to the light. The wax is then re-placed on the teeth, markings made with indelible pencil through the perforations and relief instituted by grinding.

Often, the operator may be compelled to disocclude a tooth which requires physiologic rest. In another instance, a tooth is taken out of contact in one position and reliance is placed on its contact in another excursion to prevent extrusion. The age of the patient, the relatively normal position of the jaw at that age and the resistance which has been offered by the tissues must be considered. Tolerance to maintain equilibrium between the applied force and resistance forces is ob-

10. Sorrin, Sidney. Occlusal equilibration—quo vadis. J. D. Med. 8:129 Oct. 1953.

served in many instances. Often the destruction about the teeth is due to a combination of forces in all movements of the jaw, rather than to forces applied in only one movement or position of the jaw. That is why occlusal equilibration in all movements of the jaw should be practiced, in preference to spot grinding. The effects of traumatic occlusion will depend on the magnitude and direction of forces and the tissue resistance of the individual.

Musculature, the temporomandibular joint and tissue resistance are important factors in guiding equilibrating procedures, which should be tempered with common sense and not dogmatic rules. Natural forces should be given every opportunity whenever possible.

In many instances, complete mouth rehabilitation has caused serious temporomandibular discomfort and loss of teeth, because of unnatural changes which created strain. Complete knowledge of fundamental principles of occlusion must be in the minds of those who are recommending any mouth rehabilitation, especially when it includes changes in vertical height and the creation of new guiding inclines in movements of the mandible.

In many instances rehabilitation is the only solution to the problem. In other instances, orthodontics may be helpful. However, whether occlusal equilibration is accomplished by restorations, orthodontics, grinding or any combination of these, adherence to fundamental principles in gaining occlusal harmony in all movements of the jaw is essential.

OCCLUSION AND PERIODONTAL STRUCTURES

The interrelationship of occlusion and periodontal structures has been discussed at length. The following discussion summarizes some of the points of view:[11]

Much research work has been reported on histopathologic and clinical effects of traumatic occlusion, mostly on experimental animals. Some research finds clinical, histopathologic and roentgenographic changes resulting from traumatic occlusion.[12, 13] On the other hand, there are those who have found no clinical or histopathologic signs of pocket formation, gingival recession, cleft formation, or numerous other lesions ascribed to occlusal trauma. . . .[14, 15]

Bhaskar and Orban,[16] in a recent paper based on research work on occlusal trauma on monkeys, arrived at the following conclusions:

"1. Occlusal trauma, contrary to various claims, does not produce gingivitis, periodontitis, pockets, pulp stones, recession, festoons, clefts, erosion or caries.

"2. Changes seen in occlusal trauma are specific and in their extreme consist of necrosis of periodontal tissue, resorption of bone, thrombosis and root resorption on the sides of pressure and widening of the periodontal membrane, thrombosis, and bone formation on the sides of tension. In some tension areas, root resorption also occurred.

"3. The changes seen in occlusal trauma are reversible."

Our clinical observations on almost 250,000 patients suggest that traumatic occlusion may be responsible for many of the changes reported by both sides. It is important that traumatic occlusion is only one of many factors responsible for the development of periodontal diseases.

There are many arguments against attempting to prove or disprove existing theories through work on experimental animals. Our experience with man, after careful evaluation, proves that we must be more critical of experiments on lower animals.

1. When inlays are placed on teeth of experimental animals, it is not certain whether the animals will employ these teeth for chewing.

2. Human beings are omnivorous and their methods of chewing are much different from those of lower animals. In relating occlusion to periodontal structures we must consider

11. Sorrin, Sidney. Interrelationship of occlusion and periodontal structures. J. D. Med. 11:158 July 1956.

12. Box, H. K. Experimental traumatogenic occlusion in sheep. Oral Health 25:9 Jan. 1935.

13. Stones, H. H. Experimental investigation into the association of traumatic occlusion with parodontal disease. Proc. Roy. Soc. Med. 31:479 March 1938.

14. Orban, Balint. Traumatic occlusion and gum inflammation. J. Periodont. 10:39 Jan. 1939.

15. Glickman, I., and Weiss, L. A. Role of trauma from occlusion in initiation of periodontal pocket formation in experimental animals. J. Periodont. 26:14 Jan. 1955.

16. Bhaskar, S. N., and Orban, Balint. Experimental occlusal trauma. J. Periodont. 26:270 Oct. 1955.

all movements of the jaw—centric relation, centric occlusion, lateral excursions (working and balancing sides), protrusive position and protrusive excursion.

3. All the effects of traumatic occlusion may not be observed for many years, either in human beings or in lower animals.

4. Gritting and grinding of teeth in man may occur during the day and sleeping hours. Often these habits are the result of psychogenic disorders which may require medical or psychiatric aid.

5. Loss of teeth which have not been replaced places a strain on those which remain. They move into positions not intended for them to assume and the direction and magnitude of force is changed and lesions result.

6. It is estimated that human beings swallow innumerable times per day, and teeth in premature contact will receive great strain.

7. Neurotic, occupational and miscellaneous habits together with food impactions occur more often in man than lower animals. These in turn may produce clinical and roentgenographic effects of periodontal diseases.

8. A very important habit, tongue-thrusting, has been responsible for many clinical and roentgenographic changes in the periodontal tissues.

Many clinical and roentgenographic findings have been observed in the regions affected by traumatic occlusion. It would be wise to study these signs of the interrelationship of occlusion and periodontal structures in man to ascertain improvements after occlusal equilibration and local and general health are established.

During the last few years, various reports have appeared on whether teeth make contact during mastication. Jankelson, Hoffman and Hendron[17] reported that the teeth do not contact during mastication. Anderson and Picton,[18] repeating the work of Jankelson, Hoffman and Hendron, found that teeth contact 50 per cent of the time in most subjects and in some instances nearly all the time during mastication. Yurkstas and Emerson[19] in checking on complete upper and lower dentures reported that the teeth contact nearly all the time in the act of mastication.

Whether the teeth contact during mastication may depend on the type of food which is eaten at the time of experiments. However, it is known that strains and stresses which primarily affect supporting tissues may result from either masticatory or nonmasticatory movements of the mandible. This is a most important reason for equilibrating the occlusion. The nonmasticatory types are largely, but not wholly, involuntary and consist of two main categories: swallowing contacts and grinding or clenching of the teeth.[20]

Swallowing takes place frequently during the day, as has been observed by Armstrong and Heim,[21] who reported that in human beings it occurs 700 times (a person swallows every 60 to 75 seconds during the waking hours, swallowing more often when eating and less often during sleep). Normally, during swallowing, the teeth come into contact and the pressure exerted may be considerable. There is also, however, an abnormal method of swallowing described by Rix[22] in which the tongue is thrust forward to occupy the space between the upper and lower incisors, and the teeth do not come into contact. This may result in forward displacement of the upper or lower incisors, or both, every time the act of swallowing is repeated, and the lip muscles will then pull the teeth back again. Rix made some interesting statements on swallowing and will be quoted at length. He stated:

Sillman has shown that the gum pads in the infant are not in contact at any point when the mandible is at rest. If one looks at a lateral X-ray of an infant's jaw, one is surprised to see how far apart they are. The babies look as though they have been X-rayed

17. Jankelson, B.; Hoffman, G. M., and Hendron, J. A., Jr. Physiology of the stomatognathic system. J.A.D.A. 46:375 April 1953.

18. Anderson, D. J., and Picton, D. C. A. Tooth contact during chewing. J. D. Res. 36:21 Feb. 1957.

19. Yurkstas, A. A., and Emerson, W. H. Study of tooth contact during mastication with artificial dentures. J. Pros. Den. 4:168 March 1954.

20. Cross, W. G. Treatment of the periodontal diseases. M. Press 236:198 Aug. 29, 1956.

21. Armstrong, H. G., and Heim, J. W. Effect of flight on the middle ear. J.A.M.A. 109:417 Aug. 7, 1937.

22. Rix, R. E. Deglutition and the teeth. D. J. Australia 18:431 July-Aug.; 488 Sept.-Oct. 1946.

in the act of yawning. . . . The erupting teeth and deepening alveolus gradually lessen this wide inter-maxillary space until, if you study Broadbent's tracings, occlusion is restfully reached at 2½ years. . . . the infantile swallow does not entail a closed jaw motion. The tongue spreads between the parted jaws. The swallowing of milk in any event requires the jaws to be apart. Now this is the very action so frequently seen in older children with an atypical swallow. These older children, despite the great increase in the vertical depth of filling up, as it were, of their inter-maxillary space, have not outgrown their infantile swallow. There must be a time when it is normally outgrown. Broadbent maintains that centric occlusion is not reached until about 2½ years, and it might be at about that time that the adult way of swallowing is usually acquired. . . .

In view of the frequency with which the atypical swallow is associated with very early troubles of the upper respiratory spaces, a direct causal relationship may exist. . . .

The oto-rhinolaryngologists will probably be able to suggest a reason why an unhealthy naso-pharynx produces the swallow with the teeth apart. It may be just a question of comfort. If you nip your nose and swallow with the teeth together unequal air pressures are created at each side of the tympanic membrane which are uncomfortable. During periods of intermittent nasal obstruction similar discomfort would be produced in children. Catarrh of the eustachian tubes too can produce conditions unfavourable to the equalisation of pressure upon the tympanic membrane. With the jaws separated there is an increased chance of the air pressures being kept equal, and especially during deglutition is discomfort avoided if the teeth are held apart.

If the main trend of these views can be accepted several problems can be clarified. It would allow us to throw some light on the uneasy association between adenoids and tonsils and small jaws. An abnormal naso-pharyngeal mucosa may lead to the "teeth apart" swallow, to developmental defects and to a chronic hypertrophy of lymphoid tissue, but if it did not lead on to adenoids and tonsils it could still produce an atypical swallow and developmental defects. One can thus appreciate why one sees small arches in children who apparently have no present troubles with throat and nose. . . .

It affords a more acceptable reason for the benefits upon bone growth which are credited to the chewing of tough food than is current at the moment. It is not so much the muscular vigour demanded as the type of deglutition evoked which is beneficial. In this connection one may add that dry foods evoke the "teeth together" swallow and wet foods the "teeth apart" swallow. . . .

Atypical swallowers are interesting in very many respects. Their mothers frequently complain that they tend to bolt their food, and I am inclined to think it is a correct observation, for the trapping of that part of the food, which is not yet ready to be swallowed, is not efficiently performed with the teeth apart. Those of you who heard Mr. T. B. Layton's unusual and interesting talk upon "Chewing as a Therapeutic Measure" will remember him touching upon the so-called "chewing eaters" and "gulping eaters." I think you will find that the "gulping eaters" are wrong swallowers.

Another point of interest I met with among the atypical was an occasional difficulty in pronouncing their sibilants. Whenever I have heard a lisp I have also found an atypical swallow.

Then again it is the wrong swallowers who tend to have the less clean mouths and teeth. The self-cleansing action of the mouth is impaired if the basic swallow is not performed by the tongue acting with the occluded teeth. It is a difficult point to demonstrate in the very young for it requires a considerable disturbance to upset the self-cleansing process in early life. I can remember one particular instance of a child of 3 years, who had been eating some chocolate cake, going to its mother to ask her to remove a smear of cake which remained in the vault of the palate and which its atypical swallowing movements could not dislodge. With increasing years it becomes easier to demonstrate. If any of you have an adult patient who, despite regular scaling and polishing and despite protestations that the teeth are carefully cleaned, presents himself invariably with a caseous deposit at the necks of the teeth and along the gum margins you will find, I think, that he does not swallow with his teeth together. The most detergent swallow is performed with the teeth together.

A tongue-thrust is often a very powerful one. A nonoccclusion of the teeth may result from such continued pressure. Asnis[23] has reviewed the subject and described the appliance he employs to break the habit:

The oral myodynamics of the lip, cheek and tongue musculature are of importance to the general practitioner of dentistry as well as to

23. Asnis, S. T. Guide for tongue training. J. D. Med. 8:108 July 1953.

the specialist in periodontics, orthodontics, prosthodontics, oral surgery and phonetics.[24] It is recognized that abnormal tongue force contributes to various oral disturbances.[25–29] The periodontist must contend with tongue habits which cause flared, migrated and non-occluding teeth.[5, 30] Orthodontic texts list abnormal tongue function as a cause of malocclusion and of subsequent relapse if this force remains uncorrected.[31–35] The prosthodontist is concerned with the action of the tongue in the successful construction of dentures.[36] The oral surgeon must regard the pressure on the repair tissue in cleft palate cases.[37] In the correction of speech defects the position of the tongue is important in phonetics. . . .[38] Miller states that in improper swallowing, the tongue is pushed upward on the palate and then thrust forward against or between the anterior teeth, which may cause migration or an open bite. Such patients generally have some degree of hypoesthesia of the soft palate and therefore cannot feel the food bolus in this area, necessitating the extra tongue pressure to force the food posteriorly.[27] Other patients may have started to swallow incorrectly during the nursing period, at which time a nipple which was too long and too easy flowing was used, allowing for little sucking pressure. These individuals never learned how to raise the posterior part of the tongue.[38]

Various methods are offered to correct this tongue thrust, of which the following are the most popular:

1. The patient is trained to place the tip of the tongue on the rugae of the palate and then to swallow.[27, 38]

2. The patient is instructed to place the tip of the tongue against the lingual mucous membrane of the anterior portion of the mandibular alveolus.[27]

3. It has been suggested that a hard candy be placed on the posterior part of the tongue and held up against the posterior border of the hard palate.[38]

4. Many types of punishing barbed devices, interfering appliances and guards have been used so the tongue will be pricked in malfunction or trapped and held in position.[25, 29, 39]

The first three procedures are verbal instructions to the patient, with some means of visual demonstration. The patient's reaction is usually good during the first week, but the instructions are gradually forgotten. Further, no definite constant location is possible for the tongue. The fourth method may prove harmful, and is frowned upon by psychiatrists and pediatricians alike. In brief, we are limited by verbal instruction, poor patient cooperation, and the likelihood of physical or emotional trauma.

The author feels that a non-traumagenic, physical reminder with a definite location for the tongue is a simple and quick means of breaking the tongue-thrusting habit. An appliance has been devised to act as a guide in the training of the tongue to assume a new, proper position in swallowing. . . . where it will not continue to emphasize the open bite or other abnormalities. This physical reminder and the repeated correct positioning of the tongue in swallowing will hasten the weakening of the tongue-thrusting habit.

Bruxism, a term first used by Miller in 1938, is a grinding or clenching habit which may occur unconsciously, subconsciously or consciously.[8] Nadler[40] reviewed the subject in great detail. He defines bruxism "as the grinding or clenching of the teeth at other times than the mastication of food." Also, "it might facilitate matters if the grinding and clenching habits could be referred to as the bruxistic habit—'bruxistic' thus could be the adjective for the noun, bruxism."

24. Alderisio, J. A. Electronic technic permitting multiple registrations of oral myodynamics. J. Michigan D. A. 35:97 May 1952.

25. Jackson, A. F. Some variations in the factors of malocclusion, and their relations to treatment. Internat. J. Orthodont., Oral Surg. & Radiog. 18:827 Nov. 1932.

26. Ketchum, A. H. Treatment of open-bite cases. Internat. J. Orthodont., Oral Surg. & Radiog. 17:807 Sept. 1931.

27. Rogers, A. P. Open-bite cases involving tongue habits. Internat. J. Orthodont., Oral Surg. & Radiog. 13:837 Oct. 1927.

28. Teuscher, G. W. Suggestions for treatment of abnormal mouth habits. J.A.D.A. 27:1703 Nov. 1940.

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30. Sorrin, Sidney. Habit, an etiologic factor of periodontal disease. D. Digest 41:290 Sept. 1935.

31. Anderson, G. M. Dewey's Practical orthodontia, ed. 5. St. Louis, C. V. Mosby Co., 1935, p. 432.

32. Hemley, Samuel. Fundamentals of occlusion. Philadelphia, W. B. Saunders Co., 1944, p. 228-233.

33. Strang, R. H. W. Textbook of orthodontia, ed. 2. Philadelphia, Lea & Febiger, 1943, p. 145-147, 301.

34. Swenson, Merrill G. Complete dentures. St. Louis, C. V. Mosby Co., 1940, p. 295, 617, 670.

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36. Miller, S. C. Oral diagnosis and treatment, ed. 2. Philadelphia, The Blakiston Co., 1946, p. 507-512.

37. Miller, S. C. Lecture. Postgraduate course in periodontics and oral medicine. New York University College of Dentistry, 1952. Unpublished.

38. Whitman, C. L. Habits can mean trouble. Washington D. J. 20:13 Jan. 1952.

39. Strang, R. H. W. Textbook of orthodontia, ed. 2. Philadelphia, Lea & Febiger, 1943, p. 588.

40. Nadler, S. C. Bruxism, a classification: critical review. J.A.D.A. 54:615 May 1957.

The causes of bruxism are divided into: (1) local, (2) systemic, (3) psychological and (4) occupational factors. Bruxism is often nocturnal and is frequently observed by the husband or wife whose sleep is disturbed by the noise created by the spouse.

In eliminating the habit of bruxism, it is important to acquaint the patient with the fact that the habit is present and then to remove the factors responsible for the habit. Often the mere suggestion that the habit is present is sufficient for the patient to eliminate it. Psychological suggestion before retiring is helpful. Repetition of the phrase "if I grind my teeth, they will loosen," before going to bed has been successful. Another suggestion is to keep "lips together; teeth apart." When none of these aid, a bite plate which prevents the posterior teeth from contacting during sleep has been found effective. This is preferable to splints.

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Some observations on the exudate from periodontal pockets

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Destructive periodontal disease, characterized by disintegration of the periodontal membrane and resorption of alveolar bone and usually accompanied by suppuration, is one of the most prevalent dental diseases. The precise causes of the disease are not known, although there is ample evidence to indicate that local factors such as lack of oral hygiene, irritation by calculus, occlusal trauma and microbial infection are important. There is also evidence that systemic disturbances may be of significance in some instances.

There have been many studies of the microflora obtained from periodontal pockets, but few studies have used the electron microscope. This article deals with an electron microscope study of the exudate from periodontal pockets and is a part of a program of study covering microbial, chemical and other factors associated with periodontal disease.

Exudate for electron microscope study was obtained by first washing the region with a stream of water to remove surface material and then either massaging the pocket and collecting exudate in a polyethylene capillary tube, or passing a smooth, blunt periodontal membrane explorer into the pocket to collect exudate. Generally, no hemorrhage was produced by this procedure. The exudate was transferred from the capillary tube or from the explorer to 2 ml. of distilled water and the water was shaken to distribute the material. A portion of this mixture was examined with a light microscope to determine if it contained large quantities of pus and debris. If necessary, the mixture was centrifuged

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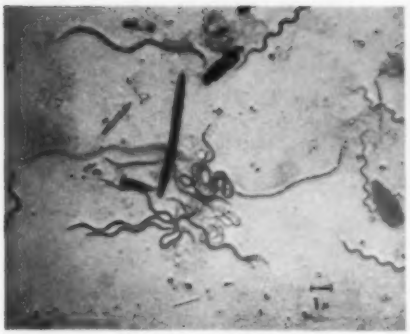

Fig. 1 • Various sizes of spirochetes and bacilli

cocci were present in all instances. Clear pictures of each form were obtained (Fig. 1-10). The fusiform bacilli clearly showed long flagella. Some bacilli showed coarse bands or granules which were apparently internal. Others showed fine structures which were apparently external. In two specimens obtained by expressing pocket contents there were fibers, apparently of pure collagen. Such fibers are difficult to obtain in whole tissue. In several samples obtained by means of the periodontal explorer, fibers that resembled denatured or partially degraded collagen were found. In most in-

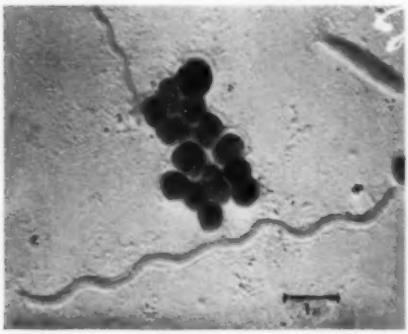

Fig. 2 • Coccoid forms, as well as spirochetes and bacilli

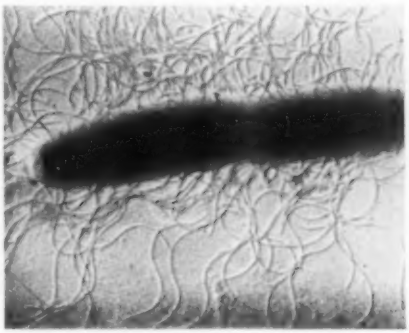

Fig. 3 • A large bacillus about to divide. This organism is probably an old fusiform bacillus, because the flagella are quite clear

and washed until the pus and debris were largely eliminated. The material was then resuspended and diluted to a suitable density. A portion of the suspension was transferred to a screen previously prepared with Form Var and was allowed to dry. The dried samples were then lightly shadowed with chromium, and inspected and photographed with the electron microscope.

RESULTS

Exudate from 25 patients was studied. It was found that spirochetes, bacilli and

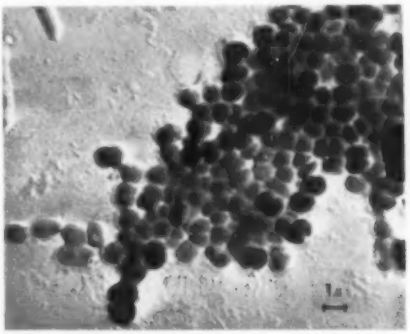

Fig. 4 • An almost pure sample of coccoid forms

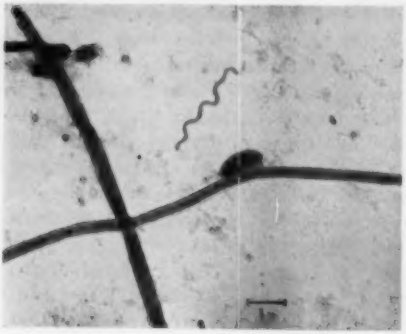

Fig. 5 • Two long, rod shaped forms with a fusiform bacillus and a spirochete. The long, spotted organism is probably some type of mold. This type was not found frequently. The spots are probably mitochondria

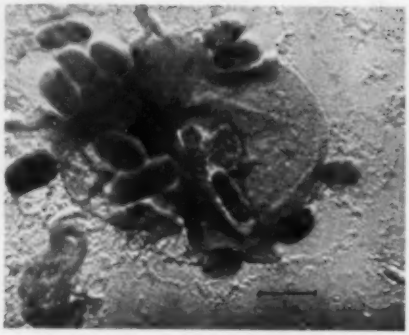

Fig. 6 • A large disklike shape overlaid by coccoid and rod forms

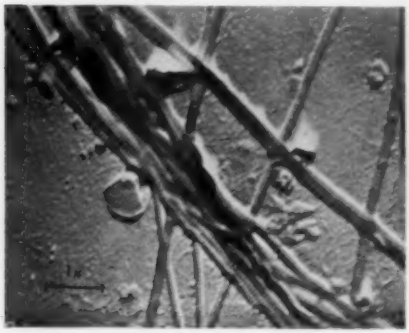

Fig. 7 • Pure, normal collagen fibers

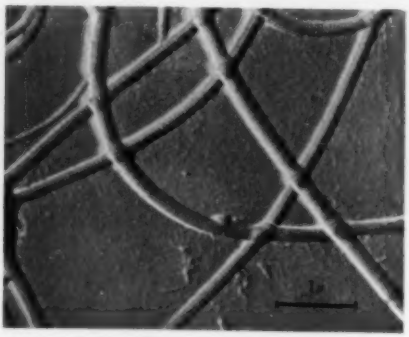

Fig. 8 • Pure, normal collagen fibers. These structures were found in only two samples

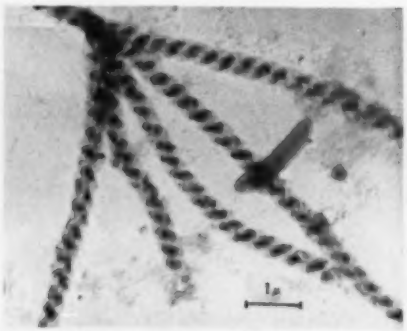

Fig. 9 • Striated frayed fibers, similar to denatured or partially degraded collagen

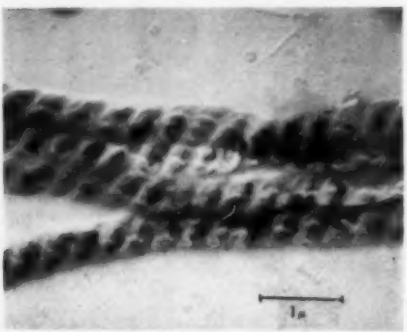

Fig. 10 • High magnification of fiber—probably denatured collagen

stances the tissue cellular material was too thick for the electron beam to penetrate; hence, photographs of such material are not presented. Most specimens contained large, thin, round particles, with crescent shaped surface detail. These have tentatively been identified as the ghosts of red cells from which the contents have been removed.

DISCUSSION

The microorganisms noted are those that would be expected on the basis of previous studies with the light microscope. The presence of collagen fibers in the exudate is surprising. Apparently, the ground substance of the connective tissue has simply dissolved, leaving the pure collagen fibers intact. The presence of the collagen fibers under these circumstances may be of considerable theoretical importance.

SUMMARY

Material from periodontal pockets was photographed with the electron microscope. The usual microorganisms and a number of collagen fibers were found.

Determination of some compressive properties of human enamel and dentin

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A large amount of information on the physical properties of the restorative materials used in dentistry has been compiled during the past years. However, relatively few data have been published on the physical properties of the hard tooth tissue, the foundation for the restorative materials. Knowledge of the physical properties of the hard tooth tissue is equally as important as knowledge of the restorative materials, since the success or failure of a restoration depends on the properties of both the material and the tooth.

The objective of this research was to supply information on some mechanical properties of enamel and dentin. The properties determined, compressive strength, proportional limit, and modulus of elasticity, are defined as follows:[1]

1. Compressive strength is defined as the maximum compressive stress which a material is capable of developing, based on original area of cross section. Stand-

The data in this report were presented in a thesis by John W. Stanford in partial fulfillment of the requirements of the Graduate School, Georgetown University, Washington, D. C., for the degree of Master of Science.

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1. Anonymous. Tentative definitions of terms relating to mechanical testing. (ASTM designation E6-54T), Philadelphia, American Society for Testing Materials, 1954.

ard tests for compressive strength specify test conditions such as size and shape of specimens in order that the stress at the critical cross section will be, as nearly as practicable, uniaxially compressive. In an investigation of hard tooth tissue, the quantity of material available is so limited that specimens cannot always be made to standard dimensions and the results obtained are not necessarily the same as would have been obtained under ideal conditions.

2. The proportional limit is defined as the greatest stress which a material is capable of developing without any deviation from proportionality of stress to strain (Hooke's Law).

3. Modulus of elasticity is defined as the ratio of stress to the corresponding strain below the proportional limit. It is equal to the slope of the straight line portion of the stress-strain diagram and is a measure of the stiffness of the material. The term modulus of elasticity alone generally refers to tensile modulus of elasticity. Moduli of elasticity in tension and compression are usually approximately equal for a given material.

An investigation of physical properties of tooth tissue was reported in 1895 by G. V. Black[2] who determined the crushing strength of 0.080 inch cubes of dentin. At that time he also reported an indication of the crushing strength of enamel. An average value for dentin was reported as 37,200 psi. With enamel specimens whose dimensions were 0.080 inch by 0.080 inch by 0.040 inch, no matter how they were cut (as to direction of the enamel rods) or how the stress was applied, enamel rods would begin to split off with very light stress as compared with dentin. The whole block collapsed at from 30 to 75 pounds load. (Approximately 4,700 to 11,700 psi).

Souder and Paffenbarger[3] in 1942 estimated the compressive strength of sound enamel to be over 100,000 psi on the basis of its hardness as compared to dentin. In 1952 Peyton, Mahler, and Hershenov[4] reported physical properties of cylinders of dentin prepared by a hollow drill coring method. After the coring of the cylinders from the teeth, the ends of the specimens were finished to insure parallelism and flatness. Tuckerman optical strain gauges were used to determine the proportional limit of the dentin. The average values reported for dentin from this study were as follows:

1. Modulus, of elasticity—1.67 x 10^6 psi
2. Proportional limit—23,400 psi
3. Compressive strength—36,100 psi

No values were reported on enamel.

EXPERIMENTAL PROCEDURE AND RESULTS

Cylindrical specimens as large as possible were prepared of enamel, dentin, and combinations of enamel and dentin including the dentinoenamel junction. The first method used in the preparation of specimens was a coring method similar to that reported by Peyton.[4] Hollow drills made of several different metals such as copper, bronze, and stainless steel were used. The abrasives used varied from aluminum oxide to diamond dust. Also, diamond particles were embedded on a phosphor-bronze tool. Because of the shattering of the enamel it was impossible to obtain specimens with these tools.

In an attempt to prepare specimens from dentin, only truncated cones could be produced by this method. The second method consisted of grinding blocks of tooth tissue into cylinders. Freshly extracted teeth were mounted in rings with gypsum and slices were made into the

2. Black, G. V. An investigation of the physical characters of the human teeth in relation to their diseases and to practical dental operations, together with the physical characters of filling-materials. D. Cosmos 37:353 May 1895.

3. Souder, W., and Paffenbarger, G. C. Physical properties of dental materials. National Bureau of Standards Circular C433. Washington, D. C., Government Printing Office, 1942, p. 101.

4. Peyton, F. A.; Mahler, D. B., and Hershenov, B. Physical properties of dentin. J. D. Res. 31:366 June 1952.

tooth using the machine shown in Figure 1. Slices were made approximately 0.1 inch apart.

After these slices were made, the teeth were remounted and slices were made at approximately 90 degrees to the previous ones. The resulting blocks from the tooth were identified as to original location. These blocks were chucked in small collets in the milling machine shown in Figure 2.

Different types and sizes of cutting wheels were used and it was found that the diamond cutting stone worked most efficiently. The tooth specimen and the diamond cutting stone were rotated in opposite directions. Light cuts were first made across the end of the block in order to true that end so that it would be perpendicular to the sides of the finished cylinder. Part of the block was then ground to a cylindrical shape as shown in Figure 3.

At this point the tooth specimen was removed from the collet and turned end for end so that the excess could be removed and the ends made plane and parallel. All cutting and grinding operations were done with a steady dripping of water on the field of cutting, and the cylinders were stored in distilled water until tested. A typical specimen of hard tooth tissue is shown in Figure 4.

A Tinius Olsen testing machine of

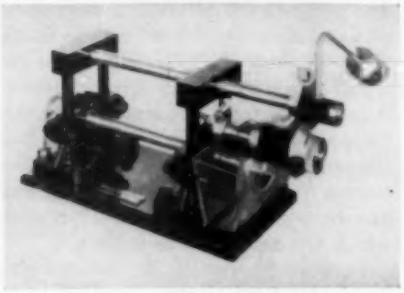

Fig. 1 • Tooth cutting machine

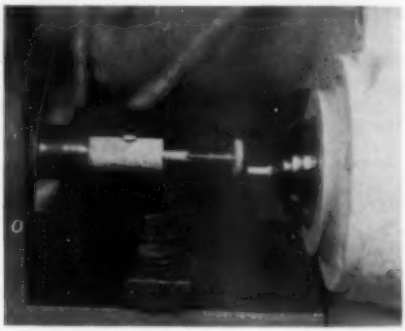

Fig. 3 • Close-up of diamond wheel and tooth tissue in milling machine

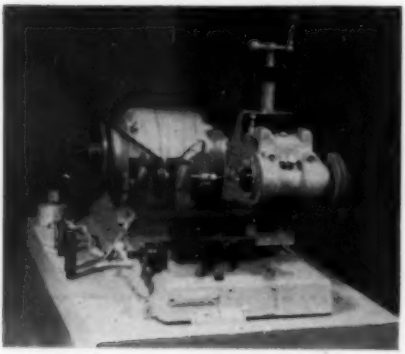

Fig. 2 • Milling machine used for making cylindrical specimens of enamel and dentin

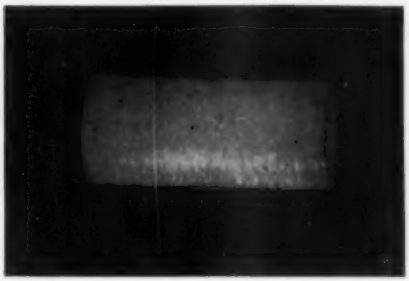

Fig. 4 • Specimen of hard tooth tissue, magnification 35X

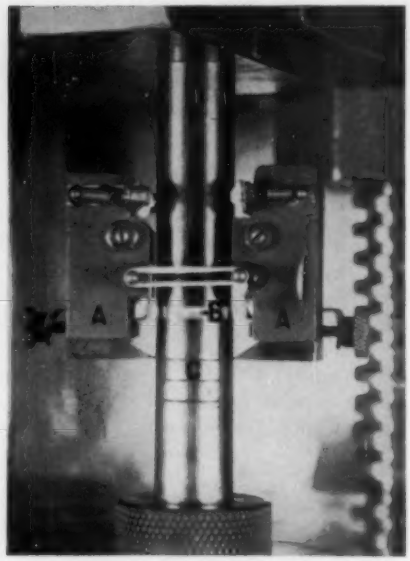

Fig. 5 • Specimen in position for determination of compressive properties. A, Tuckerman strain gauges. B, specimen of hard tooth tissue. C, platens

2,000 pounds capacity was used to apply loads to the specimens. The 0-1,000 range was used in measuring the loads. The specimens were tested between two hardened steel platens as shown in Figure 5. Two guide pins were fixed in the upper platen to align with holes in the lower platen so that during loading the platens would not get out of line.

Because of the small size of the specimens of tooth tissue it was necessary in measuring the strain to fasten the Tuckerman strain gauges to the platens (Fig. 5). The strain measurements thus included errors due to deformations in those portions of the steel platens within the gauge length and end effects. The assumption that all the deformation measured took place over the length of the specimen would be a source of experimental error.

To determine the possible amount of this error, tests were conducted on materials for which the moduli of elasticity are well known. Cylinders of carbon steel, AISI-1070; aluminum alloy, 2024-T4; and magnesium alloy, AZ31A (0.75 inch in length and 0.040 inch in diameter), were prepared in a manner similar to that used in preparing those of tooth tissue, and tested in compression. Longer specimens of these three materials were also tested in tension. The results of the two types of tests did not agree; however, there are certain corrections which can be applied to the strain data for the short compression specimens. The total deformation measured in conducting the compressive test involves four separate items which are designated as follows:

Item 1. Shortening of the specimen under ideal conditions—uniform axial load and no restraint at the ends.

Item 2. Gap effect or apparent shortening due to imperfect fit of ends of specimens with platens. Included here would also be the effect of friction between platens and ends of specimens restricting lateral expansion of the specimens near the ends.

Table 1 • Calibration data for determination of modulus of elasticity

Material	Observed E compression	Corrected E compression	Observed E tension	Accepted* E
	$\times 10^6$ psi	$\times 10^6$ psi	$\times 10^6$ psi	$\times 10^6$ psi
Magnesium alloy, AZ31A	4.2	4.8	6.5	6.5
Aluminum alloy, 2024-T4	7.2	9.6	10.5	10.6
Carbon steel, AISI-1070	14.0	32.5	28.0	29.0

*Source: Metals handbook, The American Society for Metals, 1948.

Item 3. Elastic shortening of the platens over the gauge length involved.

Item 4. Deformation of the platen surfaces or foundation effects.

There is no known equation for the correction of Item 2 since it involves probability of how the platens contact the ends of the specimens.

The deformation correction, U, for Item 3, the elastic shortening of the platens, is given by Hooke's law,[5] as shown in the following (equation a):

$$U = \frac{P(L_g - L_s)}{E_p \times A_p}$$

where: P = load
L_g = gauge length of strain gauge
L_s = length of specimen
E_p = modulus of elasticity of the steel platen
A_p = cross sectional area of platen

The deformation correction, V, for Item 4, the foundation effect for each platen, is given by the following equation[6] (equation b):

$$V = \frac{mP(1 - \nu_p^2)}{E_p \sqrt{A_s}} = \frac{P}{E_p \times d_s}$$

where: m = a function of the shape of section, 0.96 for circular cross section.
ν_p = Poisson's ratio of the platen, 0.28 for steel.
A_s = Cross-sectional area of specimen,

$\frac{\pi d_s^2}{4}$, where d_s = diameter of specimen.

Then the corrected deformation, Δ, from equation a and equation b is given by the following equation (equation c):

$$\Delta = Z - (U + 2V) = Z - \frac{P}{E_p}\left[\left(\frac{L_g - L_s}{A_p}\right) + \frac{2}{d_s}\right]$$

where Z = observed deformation, inches.

Then the strain, ε, $= \frac{\Delta}{L_g}$, and the modulus of elasticity of the specimen in compression is given by the following equation (equation d):

$$E_s = \frac{P}{A_s \varepsilon}$$

Equation d was evaluated for the three known materials after corrections in deformations (equation c) were made. The results for corrected moduli in compression, the observed moduli in compression and the accepted moduli are given in Table 1.

Examination of Table 1 showed that the corrected values of moduli in compression still differed from the measured or accepted values in tension. These differences were attributed to gap effect (Item 2) and other experimental errors. A plot of accepted values of modulus of elasticity versus the corrected values (Fig. 6) showed that the three points lie nearly on a straight line. This line together with a linear interpolation between zero and the lowest point of the curve were used to correct the moduli

5. Timoshenko, S. Strength of materials, vol. I, ed. 2. New York, D. Van Nostrand Co., Inc., 1940, p. 3.
6. Timoshenko, S. Theory of elasticity. New York, McGraw-Hill Book Co., Inc., 1934, p. 338.

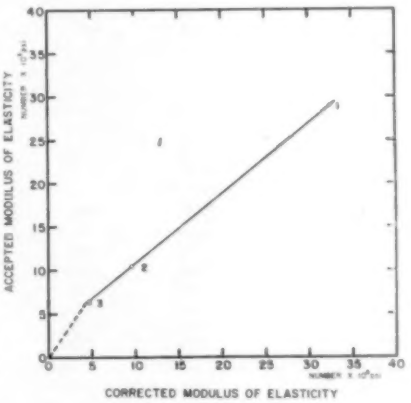

Fig. 6 • Correction curve for compressive modulus of elasticity determinations. 1, steel. 2, aluminum. 3, magnesium

of elasticity of the hard tooth tissues for factors in addition to those which were taken into account in equation c. The corrected values in Figure 6 were obtained from specimens 0.075 inch long. The correction would be expected to be greater for shorter specimens and less for longer specimens.

The results of the compression tests are given in Tables 2, 3, and 4.

DISCUSSION OF RESULTS

The data for enamel (Table 2), indicate that the values are related to the original location of the specimens in the teeth. The highest strength, modulus of elasticity and proportional limit were obtained for specimens of cusp enamel. This can possibly be explained by the presence of gnarled enamel rods in that region. The lowest values for these three properties determined on enamel were for specimens from the occlusal surface. Areas of possible decalcification may account for these lower values. Also during loading of this type of enamel specimen it was noted that at fracture the cylinder, instead of shattering, split lengthwise in tiny slivers. This type of failure would be expected if the general direction of the rods were lengthwise and if the primary failure were in the bonding material.

Table 2 • Compressive properties of enamel

Original location of specimens in tooth	Dimensions of specimens		Property determined				
			Modulus of elasticity			Proportional limit	Compressive strength
	Diameter	Length	(1) Observed	(2) Corrected[a]	(3) Average of column 2 corrected[b]		
	in.	in.	$x10^6$ psi	$x10^6$ psi	$x10^6$ psi	psi	psi
Tips of cusps	0.038	0.079	6.1	7.4		38,900	42,500
	0.040	0.065	5.3	6.7		32,000	37,600
	0.038	0.050	5.7	7.8		35,000	39,800
	0.033	0.057	4.6	5.8		31,000	41,100
Average	0.037	0.063	5.4	6.9	8.2	34,200	40,200
Side	0.038	0.071	3.8	4.3		15,000	26,600
	0.040	0.064	4.0	4.8		25,600	26,400
	0.042	0.057	4.0	4.8		24,000	31,900
	0.040	0.061	3.2	3.8		20,000	28,000
Average	0.040	0.063	3.8	4.4	6.0	21,000	28,200
Occlusal surface	0.062	0.065	1.4	1.6		10,000	11,200
	0.039	0.041	1.6	1.8		20,000	23,300
	0.040	0.026	0.4	0.4		16,000	20,800
	0.040	0.044	0.9	0.9		17,600	18,000
	0.039	0.059	0.8	0.8		20,000	22,500
	0.058	0.054	2.1	2.5		17,000	20,800
Average	0.046	0.048	1.2	1.3	1.8	16,800	19,400

a. Modulus of elasticity corrected for elastic shortening of the platens and deformation of the platen surfaces, equation c.

b. Average modulus of elasticity corrected as in (2) and then read from curve in Figure 6, thus correcting for factors which cannot be evaluated by known equations in testing small specimens.

Table 3 • Compressive properties of dentin

Dimensions of specimens		Property determined				
		Modulus of elasticity			Proportional limit	Compressive strength
Diameter	Length	(1) Observed	(2) Corrected[a]	(3) Average of column 2 corrected[b]		
in.	in.	x10⁶ psi	x10⁶ psi	x10⁶ psi	psi	psi
0.056	0.091	1.8	2.0		20,400	45,000
0.042	0.068	1.4	1.5		26,000	47,800
0.047	0.068	1.6	1.8		27,500	47,500
0.052	0.052	1.2	1.3		26,000	52,400
0.039	0.055	1.3	1.4		24,000	56,000
0.057	0.047	1.4	1.5		28,000	54,900
0.052	0.071	1.6	1.8		24,500	50,000
0.054	0.087	1.8	1.9		24,000	49,600
Average 0.050	0.067	1.5	1.6	2.2	25,100	50,400

a. Modulus of elasticity corrected for elastic shortening of the platens and deformation of the platen surfaces, equation c.

b. Average modulus of elasticity corrected as in (2) and then read from curve in Figure 6, thus correcting for factors which cannot be evaluated by known equations in testing small specimens.

Table 4 • Compressive properties of combinations of enamel and dentin

Dimensions of specimens		Property determined				
		Modulus of elasticity			Proportional limit	Compressive strength
Diameter	Length	(1) Observed	(2) Corrected[a]	(3) Average of column 2 corrected[b]		
in.	in.	x10⁶ psi	x10⁶ psi	x10⁶ psi	psi	psi
0.052	0.088	3.3	3.7		26,600	38,600
0.038	0.102	2.5	2.7		23,000	32,700
0.057	0.082	2.7	3.1		25,000	35,300
0.048	0.101	2.7	2.9		28,000	38,300
0.045	0.074	1.8	1.9		18,600	25,300
0.040	0.100	1.6	1.7		22,000	35,200
Average 0.047	0.091	2.4	2.7	3.6	23,900	34,200

a. Modulus of elasticity corrected for elastic shortening of the platens and deformation of the platen surfaces, equation c.

b. Average modulus of elasticity corrected as in (2) and then read from curve in Figure 6, thus correcting for factors which cannot be evaluated by known equations in testing small specimens.

The values determined for specimens of enamel taken from the sides of the teeth fall between the afore-mentioned determinations. In this location, the direction of enamel rods would tend to be perpendicular to the long axis of the specimen and this may account for the values obtained. Figure 7 shows a representative stress-strain curve as determined experimentally for each area of the tooth enamel tested.

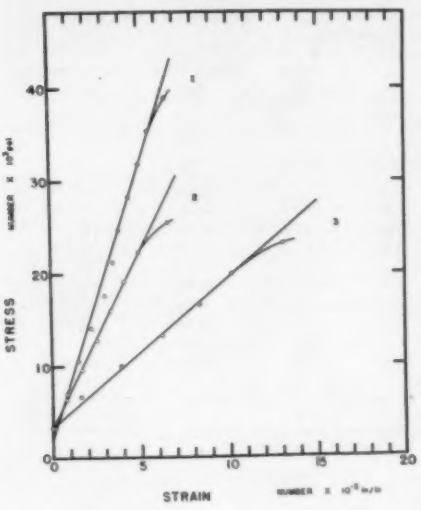

Fig. 7 • Representative stress-strain diagram for enamel. 1, cusp. 2, side of tooth. 3, occlusal surface

The data determined for dentin are shown in Table 3. No attempt was made to determine tubule direction in these specimens. The average value (50,400 psi) determined for compressive strength is higher than that reported by Peyton[4] (36, 100 psi), whereas the values for the proportional limit and modulus of elasticity with the exception of the value for the modulus (Column 3, Table 3) taken from Figure 6 are comparable. Figure 8 shows a representative stress-strain curve as determined experimentally for dentin.

The data for the three properties on combinations of enamel and dentin are shown in Table 4. The average values for the three properties appear to fall between those determined for enamel and dentin separately. Figure 9 shows a repre-

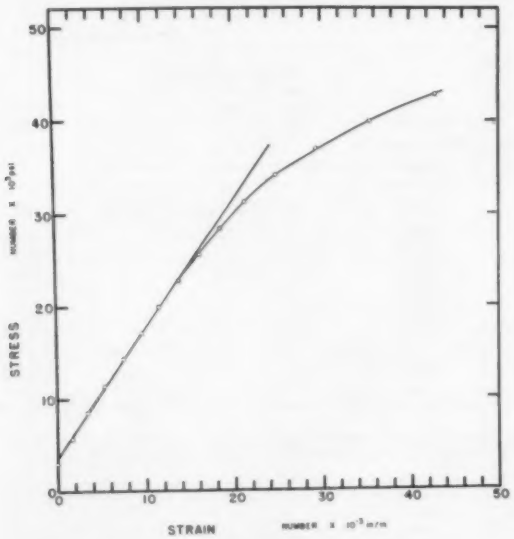

Fig. 8 • Representative stress-strain diagram for dentin

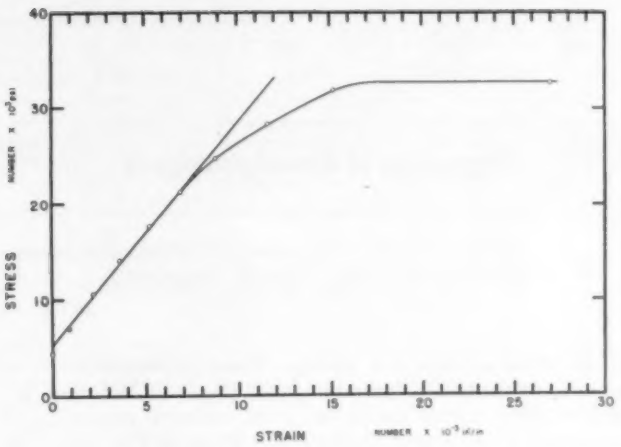

Fig. 9 • Representative stress-strain diagram for enamel and dentin combinations

Table 5 • Average values determined in compression

Material	Modulus of elasticity			Proportional limit	Compressive strength
	Observed	Corrected by equation (c)	From curve Figure 6		
	x10⁶ psi	x10⁶ psi	x10⁶ psi	psi	psi
Enamel					
Cusp	5.4	6.9	8.2	34,200	40,200
Side	3.8	4.4	6.0	21,200	28,200
Occlusal surface	1.2	1.3	1.8	15,400	18,200
Dentin	1.5	1.6	2.2	25,100	50,400
Dentin and enamel	2.4	2.7	3.6	23,900	34,200

sentative stress-strain curve as determined experimentally for dentin and enamel combinations.

SUMMARY

1. Methods for the preparation and testing of small cylinders of hard tooth tissues in compression were presented.

2. The errors in modulus of elasticity introduced by attaching the strain gauges to the platens were discussed. An equation to correct for errors which can be evaluated was given. Approximate corrections for other experimental errors in these tests were obtained from a curve derived from similar tests of materials of known modulus.

3. The average values determined in compression are shown in Table 5.

Proportion of dental amalgam

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Authorities on dental amalgam as well as manufacturers of dental amalgam alloys recommend that dental amalgam alloy and mercury be dispensed by the use of some proportioning device.

A great variety of alloy and mercury dispensers, or proportioners, is available to the dental profession. In the dental clinic of Marquette University School of Dentistry it was noted that the proportioning obtained by some of these dispensers appeared to be somewhat unreliable. Therefore, a study was undertaken to determine possible variations in proportioning caused by repeated use of several proportioning devices by one operator as well as variations caused by the use of the same equipment by various operators.

MATERIALS AND METHODS

Two basic principles are employed by manufacturers of alloy and mercury dispensers. The type of dispenser most commonly used, and the one advocated by most manufacturers of dental amalgam alloys, is based on a volumetric proportioning, whereas another type provides means for weighing out the desired mercury-alloy ratio. Mercury and alloy dispensers of these two types were purchased on the open market; the brand name, type and number of samples used in this study are listed in Table 1, together with special instructions for their use.

Three manufacturers of dental amalgam alloy supplied alloy in a dispensed form, either in pellets (L. D. Caulk Co. and Baker & Co., Inc.,) or in 6 grain envelopes (S. S. White Dental Mfg. Co.). In all three instances the manufacturers supplied mercury dispensers for use with the factory-proportioned alloy. These dispensers, as well as the pellets or envelopes, also were incorporated in this study.

In all instances the manufacturer's directions for the use of the dispensers were studied carefully. The directions always indicated that the dispensers were set for a specific mercury-alloy ratio from the factory. For most dispensers the manufacturer required that the dispenser be inverted after each dispensation. One manufacturer claimed that this action would "break the vacuum," whereas others suggested this procedure to obtain uniform packing of the cavity of the dispenser, particularly for alloy dispensation.

Some manufacturers recommended that the dispensers be jarred or tapped while the cavity of the dispenser was be-

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Table 1 • Mercury and alloy dispensers studied

Code	Name and manufacturer	Designed for	Type	Characteristics	Special instructions
A	Baker Individual Bottles Dispenser Baker & Co., Inc.	Aristaloy	Individual dispensers for mercury and alloy plunger type with spring	Mercury dispenser adjustable with settings for ratios 1.5;1.6;1.7;1.8	Useless for other alloys. Do not tap bottle. Tapping creates air pockets in reservoir. Do not pump plunger
B	Caulk Automatic Dispensers, Gray and Blue The L.D. Caulk Co.	Twentieth Century Regular Alloy	Individual dispensers for mercury and alloy plunger type with spring	Mercury dispensers have adjustment screw with lock nut; no indication of ratio	Jarring action required to fill alloy chamber and again to empty chamber
C	Caulk Twin Dispenser White Knob The L.D. Caulk Co.	Twentieth Century Regular Alloy	Twin type dispenser plunger type with springs	Mercury chamber adjustable; no indication of ratio	Jarring action required to fill alloy chamber and again to empty chamber
D	Caulk Automatic Dispensers, Red and Blue	Twentieth Century Fine Cut or Non Zinc Alloy	Individual dispensers for mercury and alloy plunger type with spring	Mercury dispensers have adjustment screw with lock nut; no indication of ratio	Jarring action required to fill alloy chamber and again to empty chamber
E	Caulk Twin Dispenser Black Knob The L.D. Caulk Co.	Twentieth Century Fine Cut or Non Zinc Alloy	Twin type dispenser plunger type with springs	Mercury chamber adjustable; no indication of ratio	Jarring action required to fill alloy chamber and again to empty chamber
F	Crandall Alloy Balance The Cleveland Dental Mfg. Co.	All brands	Balance with sliding weights	Adjustable to all ratios and amounts needed	None
G	Crescent Proportioners Crescent Dental Mfg. Co.	Cresilver	Individual dispensers for mercury and alloy dual chambers in rotating axle	Mercury chambers adjustable; no indication of ratio	Up and down jolt or tapping with hand required for alloy dispenser
H	Crescent Alloy Scale Crescent Dental Mfg. Co.	All brands	Balance with preset weight	Adjustable to all ratios needed; amount is judged by size of mercury drop	Instructions give directions for conversion to other ratios
I	Alloy Proportioner General Refineries, Inc.	Silver Crown	Plastic bar with two scoops	Nonadjustable	
J	S.S. White Dispenser #1 The S.S. White Dental Mfg. Co.	New True Dentalloy	Twin type dispenser plunger type with springs	Mercury chamber adjustable; no indication of ratio	Hold dispenser level; if tilted, dispensing may not be complete
K	S.S. White Dispenser #1A The S.S. White Dental Mfg. Co.	True Dentalloy, A Cut	Twin type dispenser plunger type with springs	Mercury chamber adjustable; no indication of ratio	Hold dispenser level; if tilted, dispensing may not be complete
L	S.S. White Mercury Dispenser and Alloy Dipper The S.S. White Dental Mfg. Co.	New True Dentalloy or Sigrens	Mercury dispenser of plunger type with spring Metal scoop for alloy dispensing	Mercury dispenser adjustable; no indication of ratio	Dispenser must be kept more than ⅓ full and must be reversed after each dispensing

ing filled, or during the release of the alloy or mercury or both into the mortar or capsule. Others recommended jarring or tapping during both procedures. One manufacturer warned against such tapping and jarring because it "creates air pockets in the reservoir."

One manufacturer claimed that his dispenser was useless for any other alloy, whereas others suggested that their mercury dispenser could be regulated sufficiently to provide the proper amount of mercury for other alloys, dispensed by their alloy dispenser.

All the alloy dispensers used were designed to give one particular amount of alloy, usually 4½ to 6 grains per dispensation. Control of the mercury-alloy ratio thus is provided by change of the amount of mercury dispensed. All mercury dispensers have an adjustment screw, the extension of which into the mercury measuring chamber can be changed, thereby regulating the amount of mercury dispensed. One manufacturer required that his mercury dispenser be kept more than one-third full to insure correct dispensation.

All dispensers were used as received from the supply house. The manufacturer's directions were followed with the exception that twin-type dispensers (mercury and alloy dispensers in one unit) were used with only one of the chambers filled at a time to control the dispensation of each material separately. In addition, the effect of tapping versus no tapping, inversion between spills versus no inversion, and the amount of material in the dispenser (full, half full or one-sixth full) was evaluated for some of the dispensers.

Control of the accuracy of the dispensers was accomplished by weighing the dispensation on an analytical balance. Each of five operators (one dentist, one dental assistant, one research assistant and two junior dental students) dispensed ten portions of mercury and alloy with each of the dispensers listed in Table 1 into preweighed glass vials. Each portion consisted of three spills of mercury or alloy. The weights of the dispensed portions were determined to the nearest milligram. Arithmetic mean weight, deviation from mean weight, x, as well as standard deviation, $\sigma = \sqrt{\frac{\Sigma x^2}{N}}$ where N is the total number of determinations (in this instance $N = 10$) was computed for each operator for each dispenser.

RESULTS AND DISCUSSION

The results are listed in Tables 2 and 3. Table 2 gives the values obtained when one mercury and alloy dispenser of each brand listed was used without and with tapping or jarring between spills, with the dispenser full, half full and one-sixth full for one or two operators. All arithmetic mean values given are arithmetic mean weights, in milligrams, of ten dispensations, each consisting of three spills. The dispensers were inverted between dispensations but not between spills. Standard deviation values in per cent are given for each arithmetic mean value. Table 2 also gives values obtained when the dispensers were inverted between spills.

The data listed in Table 2 indicate that most mercury dispensers gave better reproducibility when used half full than when full or one-sixth full. Dispensers B and J gave better results when tapped, whereas tapping did not affect dispensers A, D, G and L.

For the alloy dispensers it was noted that tapping resulted in an increased amount of alloy dispensed. This increase amounted to more than 10 per cent in some instances. The accuracy was increased by tapping for dispensers D and G but decreased slightly for dispensers A and J. No systematic variation in accuracy was noted as a result of variation of the amount of alloy present in the dispenser (full, half full, one-sixth full).

Table 2 • Weights obtained with one mercury and alloy dispenser of each brand in relation to tapping, jarring or inverting between spills, with dispenser full, half full or one-sixth full for one or two operators

Dispenser	Operator	A M* mg.	A M.D.† mg.	A S.D.‡ %	B M mg.	B M.D. mg.	B S.D. %	D M mg.	D M.D. mg.	D S.D. %	G M mg.	G M.D. mg.	G S.D. %	J M mg.	J M.D. mg.	J S.D. %	L M mg.	L M.D. mg.	L S.D. %
Alloy dispenser not tapped																			
Full	1	909	5	.6				1,159	7	.7	876	6	1.1	1,219	9	.8			
	2	912	4	.5				1,103	9	1.0	885	10	1.5	1,211	9	.9			
½ full	1	907	4	.5				1,130	35	3.5	845	40	5.6	1,225	10	1.2			
	2	908	4	.5				1,116	5	.5	880	14	2.4	1,212	18	1.9			
⅙ full	1	892	11	1.3				1,123	54	6.8	814	59	8.3	1,199	8	.8			
	2	916	4	.7				1,150	8	1.0	858	46	6.9	1,226	6	.6			
Alloy dispenser tapped																			
Full	1	927	6	.7				1,237	24	2.3	902	7	.9	1,298	8	.7			
	2	962	17	2.0				1,206	8	.8	952	18	2.4	1,243	12	1.1			
½ full	1	930	10	1.3				1,277	9	.8	888	15	2.5	1,284	18	1.7			
	2	976	10	1.2				1,218	15	1.5	947	12	1.9	1,246	21	1.9			
⅙ full	1	926	11	1.3				1,289	6	.5	894	10	1.4	1,305	16	1.3			
	2	985	14	1.9				1,227	15	1.5	934	7	.9	1,250	9	.8			
Mercury dispenser not tapped																			
Full	1	1,353	4	.3	1,048	8	1.0	1,558	2	2.4	978	5	.6	1,324	253	20.7	1,177	41	4.8
½ full	1	1,385	2	.2	1,043	30	4.0	1,560		0	973	7	.7	1,608	63	6.0	1,211	2	.2
⅙ full	1	1,392	3	.2	855	143	17.1	1,555	2	3.2	1,562	3	.2	1,571	95	7.7	1,203	3	.3
Mercury dispenser tapped																			
Full	1	1,378	2	.2	1,062	19	2.3	1,566	4	4.2	987	7	.7	1,625	40	3.7	1,213	2	.2
½ full	1	1,391	2	.2	1,044	5	.5	1,560		0	978	7	.7	1,642	7	.5	1,206	2	.2
⅙ full	1	1,395	3	.3	1,044	24	2.9	1,553	3	2.6	1,572	2	.2	1,590	43	3.7	1,157	42	5.8
Inverted before each spill; ½ full; operator 1																			
		1,389	3	.25	726	5	5.8	1,559	2	.17	979	5	.59	1,621	15	1.2	1,211	2	.17

*M, arithmetic mean. †M.D., mean deviation. ‡S.D., standard deviation.

Table 3 • Weights obtained with three mercury and alloy dispensers of each brand with several operators using the described technics

Dispenser	Operator	A M* mg.	A M.D.† mg.	A S.D.‡ %	B M mg.	B M.D. mg.	B S.D. %	C M mg.	C M.D. mg.	C S.D. %	D M mg.	D M.D. mg.	D S.D. %	E M mg.	E M.D. mg.	E S.D. %	F M mg.	F M.D. mg.	F S.D. %
Alloy dispensers																			
1	1	894	11	1.6	807	18	3.0	863	8	1.0	1,165	12	1.5	931	17	2.7	540	15	3.6
	2	913	4	.5	799	15	6.6	914	17	2.1	1,088	15	1.5	919	21	3.1	615	82	16.2
	3	896	6	.7	856	22	3.0	872	9	1.2	1,079	149	15.3	965	12	1.8	597	28	5.7
	4	913	3	.4	845	56	8.0	953	22	2.8	1,258	165	15.8	995	14	1.6	593	9	2.0
	5	889	10	1.3	834	15	2.5	914	10	1.4	1,117	10	1.1	956	6	.8	594	14	2.9
2	1	852	9	1.2	671	107	15.7	814	7	1.0	840	50	7.7	890	7	1.0	403	28	9.0
	2	890	1	.2	738	14	2.6	871	11	1.5	900	96	15.4	889	9	1.3	502	51	10.0
	3	868	69	10.7	800	56	9.0	781	22	3.5	645	161	31.1	921	21	2.5	430	16	4.1
	4	854	2	2.5	786	50	7.2	890	32	4.1	426	116	33.9	927	15	1.9	554	39	8.4
	5	843	32	5.1	801	16	2.4	871	14	2.1	1,095	14	1.6	932	5	.6	539	16	3.7
3	1	836	6	1.1	644	48	8.9				1,069	15	1.6	931	10	1.4	443	36	9.5
	2	634	188	32.9	647	87	16.4				998	21	2.4	909	16	2.2	544	38	8.6
	3	825	30	5.1	265	84	38.0				1,055	12	1.4	947	20	2.5	487	16	3.9
	4	881	4	.7	342	168	55.2				1,063	28	1.0	955	20	2.4	611	38	7.4
	5	878	12	2.1	752	39	7.1				1,018	25	2.9	952	14	1.9	591	47	10.7
Mercury dispensers																			
1	1	1,384	4	.3	684	20	4.0	1,444	9	.8	1,462	15	1.2	1,320	4	.5	1,483	98	7.6
	2	1,323	10	1.0	661	40	7.8	1,421	118	12.0	1,441	21	2.0	1,315	4	.3	915	47	6.3
	3	1,326	4	.3	720	10	1.6	1,410	45	4.5	1,445	10	.9	1,254	69	7.3	774	32	4.9
	4	1,384	3	.2	688	20	3.3	1,390	63	5.5	1,448	7	.6	1,257	15	1.2	984	64	7.4
	5	1,402	2	.2	727	13	2.0	1,445	2	.2	1,904	8	.5	1,329	13	5.2	892	29	4.0
2	1	1,290	4	.3	1,374	10	1.1	1,518	2	.2	1,360	110		1,371	7	.7	678	34	5.5
	2	1,389	4	.3	1,371	10	.9	1,502	4	.3	1,130	146	16.3	1,369	12	1.1	716	26	4.1
	3	1,386	5	.4	1,423	40	3.7	1,504	1	.1	1,281	186	17.5	1,311	33	3.0	731	44	6.4
	4	1,342	4	.3	1,524	9	.8	1,479	9	.7	1,317	170	13.5	1,344	9	1.0	868	38	5.6
	5	1,342	4	.3	1,519	3	.3	1,490	3	.3	1,772	2	.1	1,395	4	.4	822	22	3.0
3	1	1,328	2	.2	830	114	16.1				1,599	9	.6	1,417	6	.5	749	45	6.7
	2	1,320	12	1.0	1,027	138	15.3				1,608	3	.2	1,412	2	.6	773	38	6.0
	3	1,330	24	2.0	1,488	2	.2				1,611	3	.2	1,416	4	.4	768	37	6.6
	4	1,330	2	.3	1,483	3	.3				1,614	5	.4	1,422	6	.5	877	38	5.3
	5	1,339	2	.2	1,485	2	.2				1,785	2	.2	1,428	12	1.1	908	40	5.6

Table 3 • (Continued)

Dispenser	Operator	G M* mg.	G M.D.† mg.	G S.D.‡ %	H M mg.	H M.D. mg.	H S.D. %	I M mg.	I M.D. mg.	I S.D. %	J M mg.	J M.D. mg.	J S.D. %	K M mg.	K M.D. mg.	K S.D. %	L M mg.	L M.D. mg.	L S.D. %
Alloy dispensers																			
	1	904	5	.7	551	17	3.9	722	28	4.2	1,339	12	1.2	1,262	19	1.8	1,022	14	1.8
	2	1,042	40	5.0	599	32	6.4	714	32	5.6	1,313	19	1.8	1,285	20	2.1	886	28	4.1
1	3	966	14	1.8	583	30	1.2	731	12	2.1	1,339	13	1.1	1,343	22	2.1	1,062	252	1.4
	4	971	10	1.5	576	27	5.2	664	40	7.6	1,311	10	1.1	1,339	8	.7	977	13	9.2
	5	936	13	1.6	644	21	4.3				1,277	6	.5	1,278	18	1.7			
	1	1,016	8	.8	493	13	2.9	720	8	1.4	1,348	9	.7	1,311	17	1.6	919	10	1.2
	2	1,088	20	2.1	600	24	5.1	765	14	2.1	1,350	8	.8	1,298	11	1.1	860	19	2.7
2	3	1,136	12	1.6	619	36	6.8				1,341	18	2.0	1,350	14	1.3			
	4	1,040	14	1.7	517	17	3.7				1,293	8	.7	1,343	23	1.8			
	5	1,058	24	2.5	630	18	3.8				1,266	11	1.0	1,287	11	1.0			
	1	1,019	5	.7	616	28	5.7	726	10	1.7	1,350	9	.8				909	13	1.7
	2	1,078	10	1.1	593	20	4.2	776	17	2.e	1,345	3	.4				834	12	1.8
3	3	1,103	12	1.3	645	92	18.0				1,302	14	1.3						
	4	1,040	13	1.6	516	19	4.4				1,272	6	.5						
	5	1,037	22	2.4	736	88	13.8				1,264	9	.8						
Mercury dispensers																			
	1	1,571	4	.4				1,102	48	5.6	1,639	10	.7	1,664	89	6.7	1,215	1	.1
	2	1,579	6	.5				1,113	48	4.8	1,645	8	.6	1,657	79	5.4	1,218	2	.2
1	3	1,590	27	2.6				1,087	31	4.0	1,602	42	3.3	1,762	6	.4	1,220		
	4	1,569	5	6.1				1,020	48	5.2	1,643	6	.5	1,732	34	2.5	1,217	2	.2
	5	1,572	3	.2							1,611	9	.6	1,750	34	3.2	1,216	2	.3
	1	1,050	4	.5				1,207	12	1.1	1,643	8	.6	1,220	172	17.3	1,766	3	.2
	2	1,059	3	.3				1,118	51	5.4	1,665	5	.4	1,267	239	21.1	1,780	2	.2
2	3	1,043	6	.7							1,652	7	.5	1,712	44	2.9	1,779	1	.1
	4	1,040	6	1.1							1,647	8	.5	1,768	15	1.4	1,781	2	.1
	5	1,047	4	.4							1,510	131	9.1	1,610	65	4.4	1,775	2	.2
	1	1,066	6	.8				1,168	13	1.5	1,655	3	.2				1,759	4	.3
	2	1,071	8	.9				1,095	34	4.0	1,653	34	2.1				1,761	2	.2
3	3	1,052	6	.8							1,658	5	.3				1,769	2	.1
	4	1,047	4	.5							1,652	6	.5				1,761	1	.1
	5	1,046	5	.6							1,651	3	.2				1,764	4	.3

*M, arithmetic mean. †M.D., mean deviation. ‡S.D., standard deviation.

Instructions to Operator • Since the values obtained from these preliminary tests in several instances indicated a considerable degree of variation even when the same dispenser was used by one operator, it was decided to give rather specific instructions to each operator for his use of the dispensers. The technic they used follows:

Mercury Dispensers • The dispenser was one-fourth to three-fourths full. Each operator dispensed ten samples (of three spills each) from each of the different dispensers of each brand, inverting the dispenser between each spill. In addition, each operator dispensed ten samples from one dispenser of each brand without inverting the dispenser between spills.

Alloy Dispensers (Except Brand A) • The dispenser was one-fourth to three-fourths full. Each operator dispensed ten samples (of three spills each) from each of the different dispensers of each brand, tapping the dispenser between each spill. In addition, each operator dispensed ten samples from one dispenser of each brand without tapping the dispenser between spills.

Alloy Dispenser, Brand A • The dispenser was one-fourth to three-fourths full. Each operator dispensed ten samples from each dispenser of this brand without tapping the dispenser. In addition, each operator dispensed ten samples from one dispenser of this brand, tapping the dispenser between each spill.

Mercury and Alloy Balances and Scoops • Since the use of mercury and alloy balances and scoops did not seem to give rise to variations in technic, the operators were merely asked to secure ten normal samples of mercury and alloy with each instrument.

The results obtained by the five operators following these described technics are given in Table 3. The arithmetic means, mean deviations and standard deviations revealed that a considerable difference existed between the uniformity that could be obtained in proportioning mercury and alloy with various types of equipment. It therefore became necessary to evaluate the various types and brands individually.

Dispensers A • The three mercury dispensers of Brand A tested were rather uniformly set from the factory, the weights of any three spills of mercury ranging from 1,285 to 1,405 mg., or less than 10 per cent variation. Between operators the greatest discrepancy in any one dispenser was 110 mg., or 9 per cent. The standard deviation for ten determinations by one operator ranged from 0.2 to 2 per cent for the individual operators, with most values at 0.3 per cent.

The three alloy dispensers of this brand gave maximal variations of 125 mg. or 15 per cent. Between operators the greatest variation for any one dispenser was 85 mg. or ten per cent.

When the mercury and alloy dispensers are used together, with the mercury dispenser set for a 1.60 ratio (8:5), the mercury-alloy ratio could be expected to range from 1.80 to 1.28 (9:5 to 6.4:5), with a rather high incidence of values between 1.70 and 1.50 (8.5:5 to 7.5:5). The values obtained for the dispensers of this brand indicated that the most consistent results were obtained by following the manufacturer's suggestion not to tap the dispenser.

Dispensers B and D • The six mercury dispensers listed under B and D all leaked with a considerable amount of mercury at each dispensation, and the variations in arithmetic mean weights and the large standard deviations listed for these dispensers can be explained by leakage. The dispensers were not set uniformly from the factory. Even after adjustment to an approximately correct ratio these dis-

pensers gave very erratic results.

The alloy dispensers listed under B and D showed great variations between dispensers as well as between operators, as shown in Table 3.

Dispensers C and E • Dispensers C and E were of identical construction, the only difference being the size of the alloy dispensing chamber. Two twin dispensers of Brand C and three twin dispensers of Brand E were used with either alloy or mercury in the proper chambers. For Brand C the weight of any three spills of alloy ranged from 730 mg. to 1,015 mg. —a 30 per cent variation. Corresponding values for Brand E were 845 mg. to 1,015 mg., which corresponds to a 20 per cent spread. When the amounts obtained by different operators using the same dispenser were compared, it was found that the maximal range was of the same order of magnitude. Standard deviations for ten dispensations (three spills each) were of the order of 1 per cent to 4 per cent.

The mercury dispensers of these brands were of identical design. They were not set uniformly; this is demonstrated in Table 3. The weight of any three spills of mercury ranged from 1,220 mg. to 1,505 mg., or 21 per cent. Standard deviations for ten dispensations varied from 0.1 per cent (operator 3, dispenser C2) to 7.3 per cent (operator 3, dispenser E1). When the mercury and alloy dispensers are used together, with the mercury dispenser left as received from the supply house, the mercury-alloy ratio obtained might vary from slightly over 2.0 to 1.2 (10:5 to 6:5), with about half of the values between 1.6 and 1.4 (8:5 and 7:5).

Alloy Balance F • The results show that proportioning of mercury and alloy by means of a balance of this type is very inconsistent, as illustrated by the large difference in arithmetic mean weight and the corresponding large mean deviation and standard deviation values. It appears that the sensitivity of the instrument is unsatisfactory particularly for the weighing of mercury.

Dispensers G • As received from the supply house the mercury dispensers were not set for a proper mercury-alloy ratio. Also, the two chambers in each dispenser were of different size. The results listed were obtained after the two chambers in each dispenser were regulated to give an equal amount of mercury. After such adjustment the dispensers gave very good reproducibility, with maximum variation between operators of less than 3 per cent for any one dispenser. The alloy dispensers of this brand gave maximal variations of 300 mg. or 30 per cent; between operators the greatest variation for any one dispenser was 190 mg. or 20 per cent. When the mercury dispenser or alloy dispenser together with the mercury dispenser is set for a proper ratio, variations of the same order of magnitude as those mentioned under dispenser A may be expected.

Alloy Scale H • Three specimens of alloy scale H were used. As received they were set for a mercury alloy ratio of 11:7. Proportioning was accomplished by placing the desired amount of mercury in the shallow cup marked mercury, then pouring alloy into the deep cup until the beam connecting the two became counterbalanced and brought down slowly to an angle where the mercury flowed through a groove in the beam into the alloy cup.

In order to be able to compare the amount of alloy dispensed, a 1 Gm. weight was placed in the mercury cup, and alloy was poured slowly into the alloy cup until the beam began to tilt slowly. The amounts of alloy used by various operators to tilt the beam with the 1 Gm. weight varied from 475 mg. to 915 mg., corresponding to mercury alloy ratios ranging from 1.1 to 2.1. Although the balances appeared to be

rather sensitive, the standard deviations on ten proportionings with each dispenser varied from 1.2 per cent to 18 per cent for one of the operators, from 3.9 to 29 per cent for another operator. Most standard deviation values were of the order of 3.5 per cent to 6 per cent. The large values for mean deviations and standard deviations shown in Table 3 indicate that it was rather difficult to obtain consistent mercury alloy ratio with this type of equipment.

Dispenser I • Because of the extreme simplicity of these dispensers it was decided to limit the testing program somewhat as indicated in Table 3. The range of values obtained using the alloy dispenser cup was 625 mg. to 770 mg., or a 20 per cent variation. Standard deviation values ranged from 1.4 to 7.6 per cent. The mercury dispenser cup gave values ranging from 955 to 1,205 mg. which corresponds to a 25 per cent range; standard deviations ranged from 1.1 to 5.6 per cent. In actual use for dispensation of alloy and mercury, mercury-alloy ratios varying from 1.9 to 1.2 (9.5:5 to 6:5) could be expected, with a major part of the mixes in the range from 1.7 to 1.4 (8.5:5 to 7:5).

Dispenser J • These dispensers were set very uniformly as received, the weights of any three spills (one dispensation) of mercury varying from 1,550 mg. to 1,675, or less than 8 per cent. The standard deviation for ten dispensations ranged from 0.2 per cent to 9.1 per cent with 12 out of 15 values under 1 per cent. The alloy dispensation showed variations of 165 mg. or 15 per cent. For any one dispenser the greatest variation was 105 mg. or 9 per cent. For actual use, this twin dispenser would deliver mercury and alloy in proportions varying from 1.3 to 1.1 (6.5:5 to 5.5:5) with a very high incidence of values at 1.2 (6:5). Changing the ratio by regulation of the mercury set screw did not decrease the accuracy.

Dispenser K • These dispensers were identical in design to dispensers J, the only difference being the size of the alloy chamber; therefore, only two dispensers were tested. One of the mercury chambers (K2) was not set correctly from the factory, but was reset after having been used by operators 1 and 2. The large mean deviation and standard deviation values resulting from the use of this dispenser before resetting are explained as a result of using the dispenser with the set screw for mercury dividing the mercury chamber in two compartments, each so narrow that the surface tension of the mercury prevented it from filling out the compartments properly and uniformly. When the results so obtained are disregarded, the mercury dispensations ranged from 1,485 mg. to 1,785 mg., or 20 per cent variation, with standard deviation values from 14 per cent to 6.7 per cent. The alloy dispensations ranged from 1,280 to 1,385 mg., or 8 per cent variation with standard deviations of 1.0 to 2.1 per cent.

Dispenser L • This alloy dispenser is a metal scoop, to be used with a mercury bottle-cap dispenser. The testing of the alloy scoop was limited to four operators for sample 1 and to two operators for samples 2 and 3. The amounts of alloy obtained by various operators varied considerably, but it appeared that by continued use of the scoop an operator was able to obtain rather uniform results, similar to those obtained with dispenser I.

Three mercury dispensers of this model were used. One of these was left as received, whereas the two others were opened. Dispenser 1 when used by five operators gave a maximal variation of 10 mg., or less than 1 per cent, whereas dispensers 2 and 3 gave maximal variations of 20 mg., or 1.2 per cent. The standard deviations for any ten determinations never exceeded 0.3 per cent for any dispenser of this brand. When used with the metal scoop by an experi-

Table 4 • Accuracy obtainable from use of preweighed alloy

	M* mg.	M.D.† mg.	S.D.‡ %
Aristaloy pellets	280	2.7	1.0
Caulk Pellets	388	6.6	2.0
S. S. White Sigrens	382	5.3	1.5

*M, arithmetic mean.
†M.D., mean deviation.
‡S.D., standard deviation.

enced operator, a very consistent mercury-alloy ratio might be obtained.

Mercury dispenser L is also recommended by the manufacturer for use with preweighed alloy, marketed in Cellophane strip envelopes. The contents of such envelopes, together with alloy pellets marketed by two alloy manufacturers, were weighed to study the accuracy obtainable in using such predispensed alloy. The values obtained are listed in Table 4.

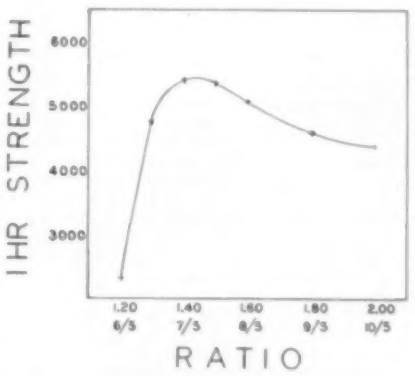
The values given in Table 4 indicate better accuracy than that obtainable with either volumetric dispensation or dispensation by weight, using commercially available alloy dispensers. The maximal variation in Sigrens alloy was found to be 15 mg., or 4.1 per cent, whereas the maximal variation for whole pellets was 20 mg., or 5.1 per cent. It should be noted that pellets must be handled somewhat carefully to avoid chipping. Only whole pellets should be used to insure accuracy.

In order to illustrate the significance of mercury-alloy ratio a series of cylindrical amalgam specimens were packed in steel molds for ultimate compressive strength and dimensional change determinations. One of the alloys which was recommended for use in a dispenser which gave rise to a considerable range of mercury-alloy ratio was chosen and specimens were made representing ratios varying from 2.0 to 1.2. The ultimate compressive strength values obtained after one hour are plotted as a function of mercury-alloy ratio in the illustration.

It will be seen from the illustration that the one hour strength varies from 2,300 psi to 5,500 psi as a function of ratio with highest strength for a 1.4 to 1.6 (7:5 to 8:5) ratio. These values were obtained with a condensation pressure of 2,000 pounds per square inch. Differences demonstrating the same trend were observed with higher condensation load and in seven day compressive strength values, but the differences were of a smaller order of magnitude, percentagewise. The dimensional changes over a 24 hour period indicated that increased mercury-alloy ratios resulted in increased expansion.

SUMMARY

Twenty-five commercially available alloy and mercury dispensers, 11 of which were twin type dispensers, were examined in order to establish the accuracy of dispensation of alloy and mercury. The dispensers in most instances were used as received from the supply house. A standard procedure was established for the use of the dispensers, and the significance of following special instructions such as



Compressive strength of amalgam specimens after one hour, in relation to mercury-alloy ratio

tapping, jarring and inverting was studied for several dispensers. Also, the effect of using the dispensers full, half full or one-sixth full was studied. Furthermore, the reproducibility in weight of predispensed alloy in pellet form or in strip envelopes was determined.

Arithmetic mean weights of ten dispensations each consisting of three spills as well as mean deviation, x, and standard deviation, $\sigma = \sqrt{\frac{N}{\Sigma x^2}}$ are given, as obtained by five operators for each dispenser.

CONCLUSIONS

1. Commercially available alloy and mercury dispensers display a great deal of difference in the degree of accuracy which may be expected.

2. Dispensation by weight is less accurate than dispensation by certain volumetric dispensers.

3. Most dispensers are not set very accurately when received from the supply house.

4. A considerable difference in alloy-mercury ratio may result from the use of most dispensers.

5. The best accuracy in mercury-alloy ratio was obtained using predispensed alloy together with a good mercury dispenser.

6. Accurate proportioning is of significance for the strength and dimensional behavior of amalgam.

Discovery and Contemporary Life • In these times when our future prosperity and indeed our survival appears to depend on discoveries in the realm of science and on their application, we should properly be concerned with how the process of discovery may be promoted. . . . the common and indispensable factor is the presence of an inquiring mind. . . . this is a prominent and indeed universal quality in the mind of a child. But let us admit that the capacity of inquisitiveness dies easily during the process of growing up. To what extent our methods of education are to blame I do not know. I suspect they often aggravate an inherited biological process. The fact is that life is a lot simpler if one does not ask questions. Those who unconsciously retain their childhood capacity for inquisitiveness while developing a critical faculty are rare and often outstanding individuals. For most people an inquiring attitude towards life requires a good deal of conscious effort.

An enquiring attitude towards life also requires a condition which is becoming increasingly rare nowadays, and that is time to think. I do not infer that the birth of an idea which leads to a discovery is necessarily a time-consuming process. Indeed, that this is not so is indicated by the term "flash of inspiration," which is often used to denote the occasion. . . .

For discoveries made by the formal method of science considerable intellectual capacity is of course needed. . . . But I think it is equally clear . . . that great intellectual capacity is by no means a pre-requisite for all or indeed for most discoveries. . . . a combination of chance and a capacity for inquiry or one might call it native wit, can make very great contributions. *R. R. H. Lovell, The Anatomy of Discovery, Austral. D. J. Dec. 1957.*

Use of epinephrine with local anesthesia in hypertensive patients
III. Effect of epinephrine on blood pressure and pulse rate

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In the first report,[1] it was shown that the systolic, diastolic, mean and pulse pressures of the dental patient in the waiting room are significantly higher than those obtained under basal conditions. In a second report,[2] it was demonstrated that only the systolic, mean and pulse pressures of the hypertensive patient in the waiting room could be reduced significantly in 45 minutes by the oral administration of 1½ grains of secobarbital. It is the aim of this third report to continue the study of the dental patient as he moves along through the dental experience by now investigating the effects of the injection of local anesthetic with and without epinephrine.

The question might be raised why lidocaine hydrochloride and epinephrine were used as the local anesthetic solution and vasoconstrictor in this study. It should be recalled that this experiment was set up in such a fashion as to simulate the procedure followed in the average dental practitioner's office.[1] In keeping with this policy, a survey was conducted to learn what the average dental practitioner administers to a patient when local anesthesia is indicated and a vasoconstrictor desirable. The survey showed that the agents employed in this study are used widely in dental practice. Thus, in order to maintain the philosophy of the experiment as in the past,[1, 2] it was felt that lidocaine hydrochloride and epinephrine should be used. In this manner, it was hoped to continue to "relive" the general office procedure and thus to be able to tell the practitioner not what to do but what he has been doing in terms of local anesthesia.

In order to appreciate fully the ramifications of this problem, it is necessary to understand the effects of lidocaine hydrochloride and epinephrine on blood pressure and pulse rate.

EFFECT OF LIDOCAINE ON CIRCULATION

Since the original work on acetanilid derivatives appeared in 1937,[3] numerous

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1. Cheraskin, E., and Prasertsuntarasai, T. Use of epinephrine with local anesthesia in hypertensive patients. I. Blood pressure and pulse rate observations in the waiting room. J.A.D.A. 55:761 Dec. 1957.

2. Cheraskin, E., and Prasertsuntarasai, T. Use of epinephrine with local anesthesia in hypertensive patients. II. Effect of sedation on blood pressure and pulse rate in the waiting room. J.A.D.A. 56:210 Feb. 1958.

3. Erdtman, H., and Löfgren, N. A new group of compounds acting as local anesthetics. Svensk. Kem. Tskr. 49:163, 1937.

articles have been published[4,5] to point out the properties and advantages of lidocaine hydrochloride as a local anesthetic agent for dental procedures. Among these many articles appear only a few remarks regarding the effect that lidocaine hydrochloride has on the circulatory system.

Goldberg[5] studied the action of lidocaine hydrochloride on the circulation of experimental animals. In the rabbit it was observed that lidocaine hydrochloride, in subcutaneous doses of 0.3 to 1.0 cc., corresponding to 2 to 7 mg. per kilogram body weight, lowered the blood pressure by 25 to 40 mm. of mercury. The same dosage of procaine reduced the blood pressure 20 to 30 mm. of mercury. Essentially the same results were observed in the cat. A 2 per cent solution of lidocaine hydrochloride with 1:100,000 epinephrine produced a rise of 15 to 30 mm. of mercury, and similar results were obtained with procaine. But with 2 per cent lidocaine and 1:500,000 epinephrine there was a variable response. Sometimes there was a rise, in other instances a fall, in blood pressure. It is of interest that no mention was made whether the alterations occurred in the systolic or the diastolic pressure, or in both of these pressures.

In 1949 Lazansky and Robinson,[6] in a study of the effectiveness of lidocaine hydrochloride as a local anesthetic agent, determined the blood pressures and pulse rates of a group of subjects. They claimed that there was an insignificant elevation of the systolic blood pressure and pulse rate after the injection of this local anesthetic agent.

Dubin and Foner[7] made over 3,000 injections of a 2 per cent solution of lidocaine hydrochloride with 1:100,000 epinephrine. They made the comment, with no citation of experimental data, that had been a slight although insignificant reduction in blood pressure. They also commented that there had been no change in the pulse rate.

EFFECT OF EPINEPHRINE ON CIRCULATION

For many years it was thought that the adrenal medulla secreted but one hormone, termed adrenaline or epinephrine. It is now known, however, that at least one other substance is also elaborated.[8-10] The more recently discovered compound has been called norepinephrine, noradrenaline, or levarterenol. It is remarkable that, though epinephrine and levarterenol possess similar chemical properties, in many respects they exert different physiologic influences.

Commercial preparations of epinephrine usually contain both epinephrine and levarterenol. This combination has been shown to act directly on cardiac muscle to cause the ventricle to contract more vigorously. As a consequence of this forceful contraction the stroke volume is augmented. If the heart rate remains constant, the cardiac output, and therefore the arterial blood pressure, will be raised. Commercial preparations also stimulate the smooth muscle fibers of most arterioles so that the caliber of these vessels is diminished. Accordingly, peripheral resistance is increased. This latter action is the major reason for the elevation in arterial blood pressure which follows the administration of this drug.

The studies of the individual components, that is, epinephrine and levar-

4. Löfgren, N. Studies on local anesthetics. Xylocaine: a new synthetic drug. Stockholm, Ivar Hoeggströms, 1948.

5. Goldberg, L. Studies on local anesthetics. III. Pharmacological properties of Xylocaine. Svensk Tandläk. Tskr. 40:819, 1947.

6. Lazansky, J. P., and Robinson, L. Study of the effectiveness of Xylocaine as a local anesthetic agent in dentistry. Oral Surg., Oral Med. & Oral Path. 2:1286 Oct. 1949.

7. Dubin, N. L., and Foner, L. M. Xylocaine. A report of 3,000 clinical cases. Oral Surg., Oral Med. & Oral Path. 5:403 April 1952.

8. Bülbring, E., and Burn, J. H. Liberation of noradrenaline from the suprarenal gland. Brit. J. Pharmacol. 4:202 June 1949.

9. Goldenberg, M., and others. Evidence for the occurrence of nor-epinephrine in the adrenal medulla. Science 109:534 May 27, 1949.

10. Tullar, B. F. Separation of L-arterenol from natural U.S.P. epinephrine. Science 109:536 May 27, 1949.

terenol, are of interest. Though both substances elevate blood pressure, it has been shown that epinephrine increases primarily the systolic pressure whereas levarterenol raises both the systolic and diastolic levels. In man, pure epinephrine actually decreases peripheral resistance. It is now known that it is the levarterenol which is responsible for the well-known vasoconstrictor effect. Aside from these differences, the two hormones possess similar actions, differing only in relative potency.[11-14]

As recently as 1939, Lundy[15] suggested that all patients 45 years of age or more be questioned regarding hypertension, renal and cardiac disease before epinephrine is used for dental purposes. It was his opinion that such a history should be taken because epinephrine can precipitate a heart attack in the dental chair.

There are numerous studies in the literature designed specifically to determine the changes in hemodynamics following the administration of epinephrine. Clough[16] studied 95 subjects. Under rest conditions each subject was given a subcutaneous injection of 1 cc. of 1:1,000 aqueous epinephrine. Observations of the systolic and diastolic pressures and the pulse rates were taken at intervals of one minute during the first five minutes after the injection and then at periods of two to three minutes for 20 to 30 minutes, or until the reaction was definitely subsiding. Further readings were then taken at five minute intervals until the original arterial pressure was reached.

Thirty-two of the subjects served as the control group. Of these, one-third gave negative reactions. In other words, according to Clough's standards, the rise in systolic pressure was less than 15 mm. of mercury, the elevation in pulse pressure was under 20 mm. of mercury, and it did not exceed the initial pulse pressure by more than 50 per cent. Half of the control group showed a moderate reaction. This was characterized by a rise in systolic pressure of 15 to 30 mm. of mercury usually associated with a drop in diastolic pressure of 10 to 20 mm. of mercury. In addition, there was a 25 to 40 mm. of mercury rise in pulse pressure which amounted to a 50 to 100 per cent elevation over the initial pulse pressure. The pulse rate in this group rose 10 to 20 beats per minute. Almost one in every five of the control subjects showed a noticeable reaction. This was characterized by an increment in systolic pressure of 30 to 50 mm. of mercury, a slight rise or fall in diastolic pressure with a 40 to 60 mm. of mercury climb in pulse pressure amounting to a 75 to 200 per cent increase over the initial pulse pressure. In a study of hypertensive subjects, noticeable reactions were observed in two thirds of the group in contrast to noticeable responses in only one in five of the normotensive subjects.

Starr and co-workers[17] concluded, from a study of six patients, that there was a slight increase in systolic pressure (4.8 mm. of mercury) and a decrease in diastolic pressure (14.5 mm. of mercury) in conjunction with a significant rise in pulse rate (21 beats per minute) 20 to 40 minutes after the subcutaneous injection of 0.7 mg. epinephrine.

Jensen[18] injected 1 cc. of an epinephrine solution, the concentration of which does not appear in his paper, into the

11. Burn, J. H., and Hutcheon, D. E. Action of noradrenaline. Brit. J. Pharmacol. 4:373 Dec. 1949.

12. Gaddum, J. H.; Peart, W. S., and Vogt, M. Estimation of adrenaline and allied substances in blood. J. Physiol. 108:467 June 15, 1949.

13. Lands, A. M. Sympathetic receptor action. Am. J. Physiol. 169:11 April 1952.

14. Luduena, F. P., and others. Comparative pharmacology of the optical isomers of arterenol. J. Pharmacol. & Exper. Therap. 95:155 Feb. 1949.

15. Lundy, C. J. What the dentist should know about angina pectoris, coronary thrombosis, and arteriosclerosis. D. Digest 45:104 March 1939.

16. Clough, P. W. Study of the cardiovascular reaction to epinephrin: epinephrin sensitiveness in patients with hypertension. Bul. Johns Hopkins Hosp. 31:266 Aug. 1920.

17. Starr, I., and others. Clinical study of the action of 10 commonly used drugs on cardiac output, work and size; on respiration, on metabolic rate and on the electrocardiogram. J. Clin. Investigation 16:799 Sept. 1937.

18. Jensen, J. Adrenalin test in hypertension. Am. Heart J. 5:763 Aug. 1930.

deltoid region of normal and hypertensive patients. He concluded that the over-all response to epinephrine in the hypertensive group did not differ significantly from that of the normotensive group. The systolic pressure increased more slowly in the normal subjects than in those with hypertension. The diastolic pressure decreased in both groups, but the return to normal was more gradual in the hypertensive group. He concluded that the epinephrine response in hypertension is a manifestation of a general hemodynamic instability.

Borg[19] administered local anesthesia (2 per cent procaine solution) with 1:50,000, 1:30,000 and 1:27,000 epinephrine to 121 subjects. He concluded that, in the small dosages routinely used in dentistry, there was no contraindication to the use of epinephrine in persons known to have hypertension or cardiac disease. These conclusions were derived solely from observations on normotensive persons.

Carr,[20] in a general discussion of the prophylactic and therapeutic management of the cardiac patient, made the statement that it is desirable to eliminate vasoconstrictors in patients with angina pectoris and hypertension. However, no experimental data were cited.

Hansen[21] pointed out in his report that epinephrine should be avoided in hypertensive persons. However, no experimental proof was offered to support his statement. Harms[22] gave two reasons, without evidence, for not incorporating epinephrine with local anesthesia: first, because of sympathetic stimulation which causes tachycardia and, second, vasoconstriction with resultant blood pressure elevation. Bloom[23] made the general statement, without citing any experimental data, that hypertension contraindicates the use of epinephrine and that it is epinephrine which causes postinjection tachycardia. Miller,[24] on the other hand, concluded that the clinical findings are mild or absent when weak concentrations of epinephrine or nordefrin are injected. His observations were based on a study of 96 patients in 300 operative sessions in which 2 per cent procaine with 1:20,000 epinephrine and 2 per cent procaine with 1:10,000 nordefrin hydrochloride were employed.

Miller and Stuart[25] listed the symptoms (apprehension, tremor, palpitation, throbbing in the head, and chest constriction) and signs (anxious facies, labored respiration, rapid pulse, tremor and perspiration) associated with the use of epinephrine with procaine. They contended that all the symptoms and signs are due to the absorption of epinephrine. Experiments were performed on 300 nonsedated persons using procaine with epinephrine in concentrations of 1:20,000 and 1:50,000 and with procaine and nordefrin 1:10,000. No mention was made whether normotensive or hypertensive subjects or both were used. They concluded that the more dilute the epinephrine solution the less noticeable are the changes in blood pressure, pulse rate and the tendency toward unpleasant symptoms and signs.

Pickering and Kissin[26] studied the blood pressure of hypertensive and control subjects after the intravenous injection of 0.5 cc. of 1:100,000 epinephrine. Under these conditions there appeared to be a fleeting rise in arterial pressure for about 15 seconds, then a slightly more prolonged fall for about 25 seconds, and

19. Borg, F. H. Effect of procaine-epinephrine solutions on the pulse rate and blood pressure. J.A.D.A. 21:868 May 1934.

20. Carr, M. W. Heart disease: prophylactic and therapeutic management of the patient in dental practice. J.A.D.A. 36:253 March 1948.

21. Hansen, O. S. Common sense about heart disease. D. Digest 38:220 June 1932.

22. Harms, B. H. Anesthetics and their side actions in oral conditions. J.A.D.A. 22:943 June 1935.

23. Bloom, D. D. Consideration of procaine anesthesia for dental purposes. D. Cosmos 76:1094 Oct. 1934.

24. Miller, H. C. Clinical reactions to various anesthetic solutions. J.A.D.A. & D. Cosmos 24:515 April 1937.

25. Miller, H. C., and Stuart, C. W. Comparative merits of vasoconstrictors in local anesthetic solutions: their practical application. J.A.D.A. 23:1883 Oct. 1936.

26. Pickering, G. W., and Kissin, M. Effects of adrenaline and of cold on the blood pressure in human hypertension. Clin. Sc. 2:201 May 1936.

then a sustained rise beginning about 45 seconds postinjection and lasting about two minutes. The deviations in arterial pressure were fairly regular and constant in normotensive subjects. The findings in hypertensive persons were much more variable and generally more pronounced.

Tainter, Throndson and Moose[27] stated, as a result of their study of 543 patients and 904 injections, that the injection on the average of 5.5 cc. of a 2 per cent solution of procaine with epinephrine increased the pulse rate, systolic pressure and pulse pressure and decreased the diastolic pressure. It was their observation that the effects were slightly more pronounced with 1:25,000 than with 1:50,000 epinephrine solutions. The pulse rate, after procaine-epinephrine injection, increased on the average 5.2 beats per minute with the 1:50,000 solution and 7.5 beats per minute with the 1:25,000 epinephrine solution. However, it was observed that the variability from one patient to another was very high. About one out of every three patients actually showed a decrease in pulse rate.

The observation was made that the injection of procaine-epinephrine solutions of other concentrations increased the average systolic pressure 3 to 4 mm. of mercury and reduced the diastolic pressure 3.3 to 5.3 mm. of mercury. Accordingly, there was an increase in pulse pressure of 6.3 to 9.2 mm. of mercury. It is of interest that no mention was made as to how long after injection these observations were made. In a later report, Tainter and Winter[28] concluded that the changes in systolic and diastolic pressure were not greater in the hypertensive than in the normotensive group.

Fatherree and Hines[29] injected intravenously a 1:250,000 solution of epinephrine into 12 normotensive and 10 hypertensive subjects. They observed that the magnitude of rise of systolic pressure in both groups was the same. In the patients with hypertension, the diastolic pressure decreased; in contrast, the diastolic pressure rose in the normotensive patients.

Goldenberg and co-workers[30] were interested in evaluating the response to epinephrine in four normotensive and three hypertensive patients. They injected intravenously epinephrine in doses of 0.15 to 0.30 mg. per kilogram body weight per minute in normotensive patients and dosages of 0.07 to 0.20 mg. per kilogram per minute in hypertensive persons. They concluded that, in the normotensive group, there was a significant rise of the systolic pressure and an insignificant reduction of the diastolic level in all instances. In the hypertensive group there was a fall of the systolic and diastolic pressures in two persons and an insignificant rise in the third. They concluded that the hemodynamic response to epinephrine in the hypertensive subject differs from that of the patient with normal blood pressure by virtue of the fact that the hypertensive person possesses a greater sensitivity to the vasodilator action of epinephrine.

Follmar[31] and Jorgensen[32] concluded, from the injection of a 1:50,000 solution of epinephrine in combination with local anesthetic solutions, that there is no contraindication to the use of small dosages of epinephrine in dentistry. However, all their studies were performed on normotensive persons and animals.

Dick[33] reviewed the general problem of

27. Tainter, M. L.; Throndson, A. H., and Moose, S. M. Vasoconstrictors on the clinical effectiveness and toxicity of procaine anesthetic solutions. J.A.D.A. & D. Cosmos 25:1321 Aug. 1938.

28. Tainter, M. L., and Winter, L. Some general considerations in evaluating local anesthetic solutions in patients. Anesthesiology 5:470 Sept. 1944.

29. Fatherree, T. J., and Hines, E. A., Jr. Blood pressure response to epinephrine administered intravenously to subjects with normal blood pressure and to patients with essential hypertension. Am. Heart J. 16:66 July 1938.

30. Goldenberg, M., and others. Hemodynamic response of man to nor-epinephrine and epinephrine and its relation to the problem of hypertension. Am. J. Med. 5:792 Dec. 1948.

31. Follmar, K. E. Study of the effect on blood pressure of epinephrine when in combination with a two percent procaine solution. M.S. thesis, Northwestern University, 1952.

32. Jorgensen, A. K. Clinical investigation of the effects of local anesthetic solutions. M.S. thesis, Northwestern University, 1953.

vasoconstrictors in connection with local anesthetic agents. He pointed out that, in the absence of vasoconstrictors with local anesthesia, the risk of producing systemic effects from endogenous epinephrine is much greater. He made the recommendation, not based on experimentation, that vasoconstrictors should be used and that the patient should be premedicated adequately with a short-acting barbiturate.

Follmar and co-workers[34] devised experiments to determine whether vasoconstricting agents should be omitted from local anesthetic solutions for use in hypertensive and other cardiac patients as well as in conditions such as hyperthyroidism and diabetes mellitus. One group of patients received an injection of a 2 per cent procaine solution containing 1:50,000 epinephrine. Another group received, by injection, only a placebo solution containing 0.9 per cent sodium chloride. Statistical examination of the data revealed that the only significant change which occurred was a decrease in diastolic pressure five minutes after the injection of the procaine solution with epinephrine. A comparative study of 2 per cent procaine with 1:50,000 epinephrine and a 2 per cent lidocaine solution with 1:50,000 epinephrine showed only a significant reduction in diastolic pressure five minutes after the procaine-epinephrine injections. The subjects utilized in this study were all normotensive.

Salman and Schwartz[35] studied ambulatory and nonambulatory patients with and without cardiovascular disease and with and without hypertension. In all instances, the blood pressure was recorded prior to, immediately after, and at intervals of two and five minutes after the injection of various types of anesthetic agents with different vasoconstrictors. The agents which were used were 1.5 per cent butethamine hydrochloride with 1:100,000 epinephrine, 1.5 per cent butethamine hydrochloride with 1:250 2-methylaminoheptane, 1.5 per cent butethamine hydrochloride with 1:500 2-methylaminoheptane, 2 per cent procaine with 1:50,000 epinephrine, 2 per cent procaine with 1:10,000 nordefrin, and 4 per cent procaine with phenylephrine (the concentration not described in the paper). However, there was no mention in the report as to which of the groups received which anesthetic agent and what vasoconstrictor was employed. In all, there were about 473 patients divided into 9 groups.

Salman and Schwartz concluded that, in general, a greater average rise in systolic and diastolic pressure in the cardiac groups occurred earlier and was higher than in the control groups. It should be pointed out that the control groups, or at least one of them, consisted of a group of chronically ill patients. The evidence also, from this report, indicated that the average reduction in systolic and diastolic pressures in cardiac patients occurred less often immediately after injection. In most patients, control or experimental, there was a decrease in systolic and diastolic pressures from that immediately after the injection to five minutes postinjection. In all groups the immediate postinjection rise in the cardiac patients was 1.5 to 5.6 mm. of mercury higher than that obtained in the control group. Finally, these investigators concluded that a greater number of patients showed a rise after injection of an anesthetic agent with a vasoconstrictor than an unchanged or decreased blood pressure. All the conclusions are based on averages with no statistical evaluation of their significance.

Costich[36] studied the blood pressure of

33. Dick, S. P. Clinical toxicity of epinephrine anesthesia. Oral Surg., Oral Med. & Oral Path. 6:724 June 1953.

34. Follmar, K. E., and others. Effects upon human blood pressure of representative local anesthetics and vasoconstrictors. Northwestern Univ. Bul. 54:13 March 1954.

35. Salman, I., and Schwartz, S. P. Effects of vasoconstrictors used in local anesthetics in patients with diseases of the heart. J. Oral Surg. 13:209 July 1955.

36. Costich, E. R. Study of inferior alveolar nerve block anesthesia in humans comparing 2.0 per cent procaine with 2.0 per cent procaine plus 1:50,000 epinephrine. J. D. Res. 35:696 Oct. 1956.

50 medical students after injections of 2 per cent procaine and 2 per cent procaine and 1:50,000 epinephrine into the pterygomandibular region. The author concluded that the procaine-epinephrine solution produced only a statistically significant postinjection reduction in diastolic pressure.

Wallace and co-workers[37] studied the cardiovascular effects of local anesthetic solutions in 19 healthy students by way of 56 experiments. The investigation was designed to detect differences in the cardiovascular system resulting from the use of 2 per cent procaine hydrochloride solutions with and without 1:50,000 epinephrine. Automatic continuous recordings of finger plethysmography, pneumography, unipolar frontal and occipital electroencephalogram leads, and standard lead I electrocardiogram determinations were made. The pulse rate was calculated from the electrocardiogram. Systolic and diastolic pressures were measured by the usual cuff method at two minute intervals. Very little of the original data were included in the paper. However, the authors contended that there was no clinically significant systemic cardiovascular reflection as measured by finger plethysmography, pneumography, electroencephalogram, electrocardiogram and blood pressure.

Davies[38] studied the changes in blood pressure and pulse rate in a group of experimental subjects who knew that no surgery was to be performed. The anesthetic solutions which were used included propoxycaine hydrochloride 0.4 per cent, procaine hydrochloride 2.0 per cent with levarterenol 1:30,000 (RNL); 2 per cent procaine with 1:50,000 epinephrine; metabutethamine hydrochloride plus 1:60,000 epinephrine; lidocaine hydrochloride with 1:50,000 epinephrine, and a placebo of isotonic saline solution. This study showed a three minute postinjection decline in systolic pressure regardless of the anesthetic solution. At the five minute postinjection point, there was a rise in systolic pressure in those persons given metabutethamine hydrochloride and a reduction in the placebo group. In general, the diastolic variations were less. In the main, the three minute postinjection diastolic pressure decreased in all categories, particularly in the placebo group. An analysis of pulse rate disclosed that, in all categories, the pulse rate increased three minutes after injection, most with metabutethamine hydrochloride and least with the placebo.

McCarthy[39] studied 40 male dental students under conditions which he felt simulated the usual dental office routine. However, all the subjects were normotensive and all were aware that there would be no dental operation performed. Blood pressure and pulse rate determinations were made prior to the actual injection study under a simulated basal state. At subsequent sittings these subjects received 4 per cent procaine, 4 per cent procaine with 1:50,000 epinephrine, 2 per cent lidocaine hydrochloride, 2 per cent lidocaine hydrochloride with 1:100,000 epinephrine, isotonic saline solution and a pseudoinjection. It was the author's opinion that fear of the injection caused an 8 mm. rise in systolic pressure, a 10.5 mm. decline in diastolic pressure and an increase of two beats per minute in the pulse rate. It was concluded that routine premedication is helpful. With regard to the changes following injection, it was found that only a mild hemodynamic pressor response could be associated with the palatine injection of isotonic saline solution.

It is abundantly clear from this review of the literature that only a very few studies have been conducted under conditions which simulate a dental office proced-

37. Wallace, D. A., and others. Systemic effects of dental local anesthetic solutions. Oral Surg., Oral Med. & Oral Path. 9:1297 Dec. 1956.

38. Davies, G. O. Comparative effects of contemporary local anesthetics on pulse character and rate. Northwestern Univ. Bul. 57:42 May 1957.

39. McCarthy, F. M. Clinical study of blood pressure responses to epinephrine-containing local anesthetic solutions. J. D. Res. 36:132 Feb. 1957.

Table 1 • Types of anesthetic injections

Type of patient	Inferior alveolar block	Maxillary infiltration
Normotensive	35	36
Hypertensive	36	31

ure.[6, 7, 19, 24, 25, 27, 28, 35] Even within this group, it is not always certain that conditions resembled those in the average office. For example, in some instances only normotensive patients were used[25, 34] and from observations of these subjects conclusions were deduced about the cardiovascular response of the hypertensive patient. In other instances it is difficult to judge the results of the study because of a lack of statistical evaluation.[35]

METHOD OF INVESTIGATION

It should be recalled[1] that the procedure followed in this study was designed to reproduce, as nearly as possible, the situation which prevails in the average dental office. In the first portion of the study, attention was focused on the blood pressure and pulse rate of the patient while seated in the waiting room anticipating surgery.[1] After measurements were taken, the patient was given a red capsule containing either 1½ grains secobarbital or a placebo. Precisely 45 minutes later the patient was ushered into the operatory and seated in the dental chair. The effect of sedation was recounted in a second report.[2]

After the patient was seated comfortably in the dental chair and the anesthetic armamentarium placed on the bracket table, the blood pressure and pulse rate were again measured. Immediately thereafter, two minutes after the patient was ushered into the dental chair, the local anesthetic solution was injected. In all instances, 2 per cent lidocaine hydrochloride was the anesthetic agent. In some instances, the anesthetic solution contained also 1:100,000 epinephrine; in other instances no epinephrine was incorporated. Table 1 shows the distribution of inferior alveolar block and buccal nerve injections versus maxillary infiltration. Table 2 outlines the amount of solution employed. Five and ten minutes postinjection, blood pressure and pulse rate determinations were made.

RESULTS

This report will consider the changes in blood pressure and pulse rate which occurred between: (1) the moment the patient was seated in the dental chair versus the findings two minutes later just prior to injection, (2) the preinjection versus the five minute postinjection measurements, and (3) the differences between the five and ten minute postinjection readings. The code used for the various groups of patients in the tabulation of data is given in Table 3.

Comparison of Observations in Dental Chair and Two Minutes Later Prior to Injection • A study of the blood pressures and pulse rates of these 136 subjects during this two minute interval showed very little change. The systolic pressure varied by 3.6 mm. of mercury, the diastolic pressure by 2.8 mm. of

Table 2 • Amount and frequency of administration of anesthetic solutions

Quantity of solution (cc.)	No. patients	Percentage
2.0	9	6.6
2.5	8	5.9
3.0	6	4.4
3.5	1	0.7
4.0	61	44.9
5.0	5	3.7
6.0	43	31.6
8.0	3	2.2
	136	100.0

Table 3 • Code used in tabulation of data

Code	Group
NNE	Nonsedated normotensive group with epinephrine
NN	Nonsedated normotensive group without epinephrine
SNE	Sedated normotensive group with epinephrine
SN	Sedated normotensive group without epinephrine
NHE	Nonsedated hypertensive group with epinephrine
NH	Nonsedated hypertensive group without epinephrine
SHE	Sedated hypertensive group with epinephrine
SH	Sedated hypertensive group without epinephrine

mercury, the mean pressure by 1.9 mm. of mercury, the pulse pressure by 1.7 mm. of mercury and the pulse rate by 0.8 beats per minute. In all instances the differences were statistically insignificant ($P > 0.05$). This phase of the study is not included here in detail simply to conserve space. However, the data are available.[40]

Comparison of Preinjection and Five Minute Postinjection Blood Pressure and Pulse Rate Levels • A comparative study of preinjection and five minute post injection values is summarized in Tables 4 to 8. Since another variable (epinephrine) is introduced at this point, there now appear eight instead of the original two[1] and four groups.[2] According to Table 4, it is clear that there was a mean rise in systolic blood pressure in all eight categories. However, the increments are small. The variations in diastolic and mean pressures, as shown in Tables 5 and 6, were even less than those observed in systolic pressure. Table 7 points up the fact that the pulse pressure variations, though small, were somewhat greater than those observed with the systolic, diastolic, or mean pressures. Finally, Table 8 shows the minor alterations which occurred in the pulse rate during the first five minute postinjection period.

The question naturally arises whether any significant differences could be observed in those persons who were given the larger amounts of anesthetic solution. Accordingly, the observations of the 43 subjects who received 6 cc. were compared with those of the 61 patients who were given 4 cc. of the anesthetic fluid. In all but four instances, the results of these groups compared favorably with the observations obtained for the entire group. There was, however, a statistically significant increase in systolic pressure only in those normotensive subjects who were given 6 cc., who received sedation, and who did not receive epinephrine. There was a statistically significant reduc-

40. Prasertsuntarasai, T. Use of epinephrine in connection with local anesthesia in dental procedures. M.S. thesis, University of Alabama, 1956.

Table 4 • Comparison of systolic pressure levels obtained prior to injection and five minutes postinjection

Groups	No. of patients	Degree of freedom	Mean preinjection systolic pressure	Mean 5 min. postinjection systolic pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	128.2	129.0	+0.8	5.34	.15	>0.05
NN	19	36	125.4	126.6	+1.2	6.78	.18	>0.05
SNE	12	22	122.3	124.1	+1.8	9.27	.19	>0.05
SN	17	32	123.5	128.3	+4.8	5.89	.86	>0.05
NHE	10	18	164.8	171.4	+6.6	5.40	1.22	>0.05
NH	10	18	160.9	168.1	+7.2	7.04	1.02	>0.05
SHE	31	60	168.7	175.5	+6.8	5.34	1.27	>0.05
SH	15	28	169.7	172.8	+3.1	9.05	.34	>0.05

Table 5 • Comparison of diastolic pressure levels obtained prior to injection and five minutes postinjection

Groups	No. of patients	Degree of freedom	Mean preinjection diastolic pressure	Mean 5 min. postinjection diastolic pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	77.3	75.3	−2.0	3.45	.58	>0.05
NN	19	36	80.7	80.8	+0.1	3.58	.03	>0.05
SNE	12	22	78.8	75.5	−3.3	4.67	.71	>0.05
SN	17	32	74.3	75.9	+1.6	4.98	.32	>0.05
NHE	10	18	108.7	108.2	−0.5	7.13	.07	>0.05
NH	10	18	100.7	102.6	+1.9	5.48	.35	>0.05
SHE	31	60	104.2	103.5	−0.7	3.13	.22	>0.05
SH	15	28	105.2	104.3	−0.9	4.68	.19	>0.05

Table 6 • Comparison of mean pressure levels obtained prior to injection and five minutes postinjection

Groups	No. of patients	Degree of freedom	Mean preinjection mean pressure	Mean 5 min. postinjection mean pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	102.7	102.2	−0.5	4.07	.12	>0.05
NN	19	36	103.0	103.7	+0.7	4.96	.14	>0.05
SNE	12	22	100.6	99.8	−0.8	6.55	.12	>0.05
SN	17	32	98.9	102.1	+3.2	4.91	.65	>0.05
NHE	10	18	136.8	139.8	+3.0	5.27	.57	>0.05
NH	10	18	130.8	135.4	+4.6	5.42	.85	>0.05
SHE	31	60	136.4	139.5	+3.1	3.72	.83	>0.05
SH	15	28	140.8	138.5	−2.3	5.85	.39	>0.05

Table 7 • Comparison of pulse pressure levels obtained prior to injection and five minutes postinjection

Groups	No. of patients	Degree of freedom	Mean preinjection pulse pressure	Mean 5 min. postinjection pulse pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	50.9	53.7	+2.8	3.82	.73	>0.05
NN	19	36	44.7	45.8	+1.1	4.36	.25	>0.05
SNE	12	22	43.5	48.6	+5.1	6.72	.76	>0.05
SN	17	32	49.2	52.4	+3.2	3.96	.81	>0.05
NHE	10	18	56.1	63.2	+7.1	7.02	1.01	>0.05
NH	10	18	60.2	65.5	+5.3	6.40	.83	>0.05
SHE	31	60	64.5	72.1	+7.6	4.61	1.65	>0.05
SH	15	28	64.5	68.5	+4.0	6.03	.66	>0.05

Table 8 • Comparison of pulse rate obtained prior to injection and five minutes postinjection

Groups	No. of patients	Degree of freedom	Mean preinjection pulse rate	Mean 5 min. postinjection pulse rate	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	76.2	80.6	+4.4	3.50	1.26	>0.05
NN	19	36	83.5	85.6	+2.1	3.96	.53	>0.05
SNE	12	22	80.0	81.9	+1.9	5.53	.34	>0.05
SN	17	32	79.1	79.7	+0.6	3.32	.18	>0.05
NHE	10	18	76.8	83.6	+6.8	3.97	1.71	>0.05
NH	10	18	74.0	75.2	+1.2	5.13	.23	>0.05
SHE	31	60	83.8	89.3	+5.5	3.37	1.63	>0.05
SH	15	28	88.3	89.3	+1.0	4.68	.21	>0.05

tion in diastolic pressure only in those normotensive patients receiving 4 cc. of the anesthetic solution, who received sedation and did receive epinephrine. Third, there was a statistically significant rise in pulse pressure in those hypertensive subjects who received 4 cc. of the anesthetic solution, sedation and epinephrine. Finally, a statistically significant increase in pulse rate was observed only in the hypertensive patients who were given 4 cc. solution, sedation and epinephrine.

It is highly possible that these four exceptions might well be the result of the fact that, in this subdivision by dosage, the groups became very small in number. Unquestionably, this aspect should be repeated with larger groups.

Comparison of Five and Ten Minute Postinjection Blood Pressure and Pulse Rate Levels • The variations in blood pressure and pulse for the second five minute postinjection period are shown in Tables 9 through 13. It is clear that most of the subjects showed very little change. According to Table 9, the variations in systolic pressure, though in themselves rather small, were more obvious than those noted in the diastolic, mean, and pulse pressures as well as the pulse rates.

Once again the question naturally arises whether any significant changes could be ascribed to different amounts of local anesthetic. A study of the 43 subjects who received 6 cc. and the 61 patients who were given 4 cc. showed no significant differences between these groups and the over-all picture shown in Tables 9 through 13.

COMMENT

It is clear from these data that the systolic pressure is less stable (more variable) than the diastolic, mean and pulse pressures and the pulse rates. Table 4 shows that there are minor elevations in systolic blood pressure five minutes postinjection. It is evident from Table 9 that, at the end of the ten minute postinjection period, in all groups but one (nonsedated normotensive group with epinephrine) systolic blood pressure decreased. What is particularly important (Tables 4 and 9) is the lack of statistical significance ($P>0.05$) in all categories. Tables 5 and 10 summarize the diastolic changes and Tables 6 and 11 the mean pressures. Here the variations are even smaller and also statistically insignificant. The over-all pulse pressures, larger than any others mentioned (Tables 7 and 12) likewise show $P>0.05$. Finally, the small and statistically insignificant pulse rate variations are shown in Tables 8 and 13.

CONCLUSIONS

1. In an earlier report,[1] it was learned that the systolic, diastolic, mean and pulse pressures are higher in the waiting room

Table 9 • Comparison of systolic pressure levels obtained five minutes and ten minutes postinjection

Groups	No. of patients	Degree of freedom	Mean 5-min. postinjection systolic pressure	Mean 10 min. postinjection systolic pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	129.0	129.5	+0.5	5.97	.08	>0.05
NN	19	36	126.6	125.5	−1.1	6.50	.17	>0.05
SNE	12	22	124.1	123.3	−0.8	9.60	.08	>0.05
SN	17	32	128.3	124.5	−3.8	4.99	.76	>0.05
NHE	10	18	171.4	168.1	−3.3	6.65	.50	>0.05
NH	10	18	168.1	163.2	−4.9	6.78	.72	>0.05
SHE	31	60	175.5	173.2	−2.3	5.58	.41	>0.05
SH	15	28	172.8	172.3	−0.5	8.61	.06	>0.05

Table 10 • Comparison of diastolic pressure levels obtained five minutes and ten minutes postinjection

Groups	No. of patients	Degree of freedom	Mean 5 min. postinjection diastolic pressure	Mean 10 min. postinjection diastolic pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	75.3	74.2	−1.1	3.65	.30	>0.05
NN	19	36	80.8	80.2	−0.6	3.77	.16	>0.05
SNE	12	22	75.5	76.7	+1.2	5.48	.22	>0.05
SN	17	32	75.9	76.1	+0.2	5.05	.04	>0.05
NHE	10	18	108.2	105.3	−2.9	7.03	.41	>0.05
NH	10	18	102.6	100.0	−2.6	4.57	.57	>0.05
SHE	31	60	103.5	102.2	−1.3	3.29	.40	>0.05
SH	15	28	104.3	107.2	+2.9	4.33	.67	>0.05

Table 11 • Comparison of mean pressure levels obtained five minutes and ten minutes postinjection

Groups	No. of patients	Degree of freedom	Mean 5 min. postinjection mean pressure	Mean 10 min. postinjection mean pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	102.2	101.9	−0.3	4.53	.07	>0.05
NN	19	36	103.7	102.9	−0.8	4.90	.16	>0.05
SNE	12	22	99.8	100.0	+0.2	7.08	.03	>0.05
SN	17	32	102.1	100.3	−1.8	4.65	.39	>0.05
NHE	10	18	139.8	136.7	−3.1	5.53	.56	>0.05
NH	10	18	135.4	131.6	−3.8	4.82	.79	>0.05
SHE	31	60	139.5	137.7	−1.8	3.91	.46	>0.05
SH	15	28	138.5	139.8	+1.3	6.12	.21	>0.05

Table 12 • Comparison of pulse pressure levels obtained five minutes and ten minutes postinjection

Groups	No. of patients	Degree of freedom	Mean 5 min. postinjection pulse pressure	Mean 10 min. postinjection pulse pressure	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	53.7	55.3	+1.6	4.02	.40	>0.05
NN	19	36	45.8	45.3	−0.5	4.09	.12	>0.05
SNE	12	22	48.6	46.7	−1.9	6.66	.29	>0.05
SN	17	32	52.4	48.4	−4.0	3.80	1.05	>0.05
NHE	10	18	63.2	62.8	−0.4	8.07	.05	>0.05
NH	10	18	65.5	63.2	−2.3	6.38	.36	>0.05
SHE	31	60	72.1	71.0	−1.1	4.76	.23	>0.05
SH	15	28	68.5	65.1	−3.4	6.00	.57	>0.05

Table 13 • Comparison of pulse rate obtained five minutes and ten minutes postinjection

Groups	No. of patients	Degree of freedom	Mean 5 min. postinjection pulse rate	Mean 10 min. postinjection pulse rate	Mean difference	Standard error of difference between means	Observed t value	P
NNE	22	42	80.6	80.3	−0.3	3.45	.09	>0.05
NN	19	36	85.6	83.9	−1.7	3.95	.43	>0.05
SNE	12	22	81.9	83.3	+1.4	6.66	.21	>0.05
SN	17	32	79.7	79.9	+0.2	3.17	.06	>0.05
NHE	10	18	83.6	82.0	−1.6	4.49	.36	>0.05
NH	10	18	75.2	73.2	−2.0	5.02	.40	>0.05
SHE	31	60	89.3	88.6	−0.7	3.60	.19	>0.05
SH	15	28	89.3	89.5	+0.2	4.61	.04	>0.05

compared with those under basal conditions.

2. The observations in a subsequent report[2] disclosed the fact that the increase in systolic, mean and pulse pressure in hypertensive patients in the waiting room could be significantly reduced by the oral administration of 1½ grains of secobarbital 45 minutes prior to ushering the patient into the dental chair.

3. It is clear from this study that only small, and in practically all instances statistically insignificant, variations in blood pressure and pulse rate occur two minutes after the patient is seated in the dental chair, that is, preinjection, and five and ten minutes after the injection of a local anesthetic solution with or without epinephrine in sedated or nonsedated normotensive and hypertensive patients.

SUMMARY

Under a simulated office procedure, it appears that the systolic, diastolic, mean and pulse pressures as well as the pulse rate vary extremely little two minutes after the patient is seated in the dental chair, that is, preinjection, and five and ten minutes after the injection of 2 to 8 cc. of a 2 per cent lidocaine hydrochloride solution with or without 1:100,000 epinephrine in normotensive or hypertensive patients who had or had not been sedated with 1½ grains secobarbital that had been given orally.

The fourth report in this series will analyze the last stage in the patient's course through the dental office—the effect of tooth extraction on the blood pressure and pulse rate.

Motion and time study in dentistry

Marvin E. Mundel, Ph.D., Milwaukee

The one factor which inevitably limits the professional activity of the practicing dentist is the amount of time and physical energy at his disposal. As far as the amount of time is concerned, a reasonably normal life puts a fixed limit on that. As to the expenditure of physical energy, much has been done in modern dentistry to reduce its expenditure, but normal work routines are still appalling in their physical demands. This statement may sound a bit strong; however, there are two mirrors in which the dentist can examine his own efforts. Such an examination will permit any dentist to study the personal validity of this statement and plan a cure if he has the desire.

A motion study is merely the use of a set of technics for systematically finding a preferable way of doing work. In the case of the practicing dentist, the criterion of preference is surely easy to state: To find ways of rendering either as good a service as he has been rendering, or a better service, with less expenditure of physical energy, or of accomplishing more work without increasing the expenditure of physical effort.

Although motion study technics were developed originally for industrial activities, they are readily applicable to the nonroutine, professional activities of the dental practitioner. The method of application, however, will differ. A second party may aid in developing an effective method for an industrial routine; however, the dentist must be his own "improver." Further, the improvements which are developed must be compatible with all the ethical and technical aspects of dental practice; however, working in an unnecessarily arduous fashion is not a professional requirement.

The application of motion study to the amelioration of the physical effort in a task requires a logical pattern of seven steps,[1] as follows:

1. Aim. Determination of objective . . . and the establishment of criteria for evaluating the preferability of a solution.

2. Analysis. The reduction of the work method into subdivisions, or steps, pertinent to the job, appropriate to its scope, possessing known characteristics, or concerning whose performance information is already available.

3. Criticism. The application to the analysis of basic data, or check lists of desirable arrangements (for) a preferable work pattern and of information concerning desirable ways of performing . . . steps (of the work).

4. Innovation. The formulation of a new suggested procedure for performing the work.

5. Test. The testing by means of the data used in Step 3, of the desirability

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1. Mundel, M. E. Motion and time study, ed. 2. Englewood Cliffs, N. J., Prentice-Hall, 1955. p. 23-24.

of the method formulated in Step 4, in respect to the objective stated in Step 1.

6. Trial. The sample application of the method tested in Step 5.

7. Application. (Using the improvement.)

The probable criterion of preference or objective has already been discussed. It is the second step which is most important for two reasons. First, without adequate analysis, no problems are solved adequately. Second, inasmuch as the work of each dental practitioner is different, each improved method will have a certain personal aspect and hence, each dentist should, to some extent, make his own analysis.

Two procedures for self-analysis will be discussed: these are the two mirrors already mentioned.

The first question which the dentist should ask himself is, "How do I spend my time and effort?" The startling aspect of this question is that the dentist probably does not really know, and some effort is required to find out. However, this question is vital to real improvement in physical ease of work.

WORK SAMPLING TECHNIC

A technic used in industry called "work sampling" provides a means of answering this question readily with a minimum of work. It is based on two, well-established propositions: a random sample properly extracted from a large "population" is representative of the "population," and it is possible to take the time to examine a sample with much greater care than a whole "population."

It has been shown that if an industrial worker is observed at random intervals (sampled) over a period of time, no matter how nonrepetitive his job, and if at each observation the particular activity being performed is recorded, the resulting tally of observations eventually will constitute a description of his task. If the tally of observations of any one type of activity is divided by the total number of all observations and multiplied by 100, there will be, within statistical limits (and by governing the number of observations made, these limits can be controlled), the percentage of time at that activity in the whole task. A list of these percentages will indicate how his total time is used.

This technic may be adapted readily to an analysis of dental practice and (considering the individuality of practices) is almost a necessity for finding a place to start. To make a study of a person's activity (or, "to sample his activity"), two things must be determined first:

1. Random occasions for noting what is being performed. These occasions must not be related to the natural time periods of the practice; that is, sampling once each hour, on the hour, might lead to observing only the changing of patients.

2. A set of categories for describing properly, for each occasion when an observation is made, what is being done in terms pertinent to the objective of the study. Inasmuch as the dentist would probably like to know where and how his time is used, this description should consist of three parts: (1) where the dentist is; (2) exactly what he is doing; (3) what he is using or working with, that is, "in operatory," "restoration," "locating bur in drawer of cabinet behind him."

To obtain a reasonably realistic picture, observations should be made on at least 1,000 separate occasions. As a practical means of doing this and handling the subsequent information in a convenient fashion, it is suggested that the dentist obtain 1,000 3 by 5 cards and mark them, before starting the study, as follows: the first two cards are marked with the hour and minute of normal work starting time, the next two are marked with the time of the next minute, the next two for the next minute and so forth; that is, if work starts at 8:30, there will be two cards for 8:30,

two for 8:31, two for 8:32 and so forth, skipping lunch hour. If two cards are prepared for each minute of the working day, there will be approximately 1,000 cards. To reach a round number of 1,000, which will facilitate final computations, additional cards may be marked for various times of the day (hour and minute) selected at random, giving three cards for some of the times.

The completed deck of 1,000 cards should be shuffled thoroughly and counted off into piles. The number in each pile and the number of piles will depend on how many observations are to be made each day. It is suggested that the number be reasonable so that the task will not be onerous. Further, the days studied need not be in sequence, but may be chosen at random. If 50 observations are to be made per day, the deck will be divided into 20 piles. The cards in each pile should be arranged in time sequence to give the list of times of the occasions when an observation and record will be made, during that day, of what is being done. A different pile of cards should be used each day, and the cards used to record the activity observed at that instant as previously described. An alarm clock or an assistant should be used to indicate during the day when the "observation times" occur, as they occur, and what is written on the card should be as of that instant.

Subsequent to having activity entries on the entire 1,000 cards, the dentist should sort them into like activity groups and tally the groups and compute the percentage for each. Several sorts may be made. One sort might be by location. The computations after this sort will give the percentage of use of the different parts of the office. One sort might be by type of work, and so forth (see table).

Such an analysis will be of tremendous value in (1) deciding what effect additional assistance would have; (2) deciding what tasks are most time consuming; (3) relating time expenditure to charges; (4) finding where time is really spent; (5) providing a basis for evaluating the desirability of different equipment. This list is not exhaustive.

The table gives the data obtained from a sample of 498 observations made by a practitioner who worked without an assistant and that obtained from 359 observations of a practitioner with one assistant.

MEMOMOTION TECHNIC

The second technic for self-analysis involves the use of a motion picture camera, but instead of taking pictures at the normal rate, 16 pictures per second, only one picture is taken per second. Taking the pictures in this fashion (called memomotion in industry) possesses several unique advantages; for example, a 100 foot roll of film will record one hour instead of four minutes; a viewing of the film at normal projection speed will permit rapid viewing of a long period of work besides giving a new view of it. (A film of this type, "Motion Study in Dentistry," is in the American Dental Association Film Library.)

The normal office or operatory, when viewed with the aid of such films, usually shows:

1. Improper placement of materials. They are not stored so that they are convenient to the person who gets them. Little thought appears to be given to comfortable reaching distances.

2. Interference between dentist and assistant. One or both have inadequate working space.

3. Obviously uncomfortable postures for dentist, patient and assistant.

4. Excessive turning and reaching.

5. No clear flow pattern for instruments and materials.

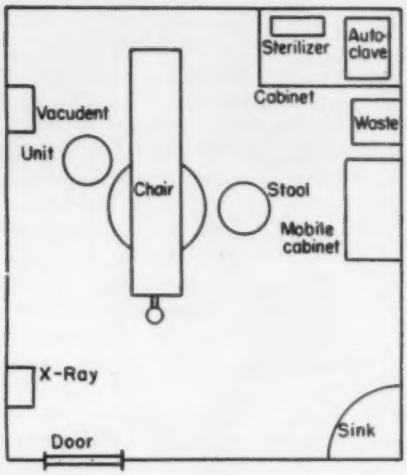
6. Lack of clear delineation of duties of members of dental team.

It is suggested that the interested person consult the extensive literature in mo-

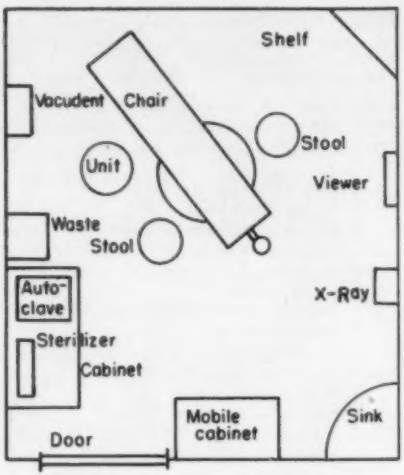
Table • Work sample

Practitioner without assistant	Min.
Rank 1. Total—149. Nonproductive (30%)	
A. Idle	124
B. Personal	25
Rank 2. Total—111. General (22%)	
A. Making appointments	51
B. Seating and dismissing patient	15
C. Delay caused by patient	12
D. Housekeeping & supplies	11
E. Presenting case	9
F. Preparing for specific patients	9
G. Receiving money	4
Rank 3. Total—103. Restoration (21%)	
A. Working with amalgam	31
B. Preparing cavity	31
C. Working with matrix band	13
D. Applying temp. filling	7
E. Removing temp. filling	5
F. Checking & adjusting occlusion	4
G. Scaling and cleaning	3
H. Applying thymol lining	3
I. Applying cement base	2
J. Polishing filling	2
K. Verifying shade	1
L. Applying calcium hydrox. paste	1
Rank 4. Total—60. Roentgenograms (12%)	
A. Taking, developing, reading roentgenograms	48
B. Examination	12
Rank 5. Total—52. Surgical (10%)	
A. Extracting	22
B. Injecting anesthetic	11
C. Giving postoperative instructions	8
D. Postoperative checking or treating	7
E. Treating gums	2
F. Surgery	1
G. Painting with Merthiolate	1
Rank 6. Total—23. Denture work (5%)	
A. Preparing for or taking impressions	7
B. Checking fit of complete denture	3
C. Pouring impressions	2
D. Inserting partial denture	2
E. Adjusting partial denture	2
F. Mixing impression material	1
G. Mixing silicate	1
H. Mixing plaster	1
I. Polishing silicate	1
J. Cementing facing to upper tooth	1
K. Taking wax bite	1
L. Polishing lower lingual bar in laboratory	1

Practitioner with assistant	Min.
Rank 1. Restorations—107 (30%)	
A. Preparing, placing, finishing trimming mixing and polishing fillings	98
B. Placing base	8
C. Holding celluloid strip work	1
Rank 2. General—95 (26%)	
A. Making examination	32
B. Seating & excusing patient	21
C. Personal	21
D. Talking to patient	11
E. Taking, checking & explaining roentgenograms	11
F. Signing card	1
G. Adjusting head rest	1
H. Idle	1
I. Attending meetings	10
Rank 3. Prophylaxis—45 (13%)	
A. Scaling & cleaning teeth	29
B. Giving prophylaxis	8
C. Giving fluoride treatment	8
Rank 4. General—44 (12%)	
A. Wiring & going over records	14
B. Phoning	7
C. Financial work & mail	4
D. Talking to nurse & patient	3
E. Checking roentgenograms	1
F. Idle	2
G. Personal	8
H. Talking to nurse	3
I. Taking examination	1
J. Dictating instructions	1
Rank 5. Dentures—44 (12%)	
A. Adjusting, cementing & trying complete & partial dentures	27
B. Taking & carving wax impressions	14
C. Putting wires on appliances	3
Rank 6. Surgical—11 (3%)	
A. Applying silver nitrate	7
B. Giving local anesthetic	7
C. Extracting teeth	3
D. Treating periodontal pocket	1
E. Placing cavity liner	1
F. Relieving toothache	1
G. Waiting for anesthetic to take effect	1
Rank 7. Denture work in lab.—11 (3%)	
A. Working on prosthesis	10
B. Waxing impression trays	1
Rank 8. Surgical—1	
A. Preparing penicillin	1
Rank 9. Restorations—1	
A. Mixing alginate	1



Original operatory



Improved operatory

tion and time study for general methods of improving work habits.

At the left of the illustration is shown a typical operatory prior to examination with this technic. At the right is the revised operatory after study of the films. The revision had the following advantages,

1. Less travel around the room by both dentist and assistant (approximately 90 per cent eliminated).

2. More time for dentistry during operatory periods.

3. More space for actual work.

In short, the revision made better dentistry easier. It is hard, if not impossible, to describe the contrast visible on the films of the two operatories. The original film was hectic when compared with the film taken after improvement of the operatory. The details of the improvements will not be discussed here; they are not the point. The basic thesis is that dental activity can be improved from the standpoint of reducing physical effort, and that self-analysis is the key tool; that is, intelligent, systematic self-analysis rather than "gadgeteering." Two tools have been proposed that have been use-tested, and are offered for consideration.

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Diseases • Diseases are the penalties we pay for our over-indulgence, or for our neglect of the means of health. In these days half our diseases come from the neglect of the body, and the over-work of the brain.—In this age the wear and tear of labor and intellect go on without pause and self-pity.

We live longer than our forefathers; but we suffer more, from a thousand artificial anxieties and cares. They did fatigue only their muscles; we exhaust the finer strength of our nerves. ***Edward George Bulwer-Lytton.***

Opportunities of service

Doyle J. Smith, D.D.S., Memphis, Tenn.

In October 1957, our misguided, missile friends, the Russians, sent up a little fellow traveler called "Sputnik" whose radio voice beeped triumphantly at the earth from every quarter of outer space. As Defense Secretary Wilson said, this was a neat scientific trick. We may agree it may even be a great scientific accomplishment. In either case, it does not seem to have added much to the sum of earth's happiness. A perspicacious French newspaper put the event in its proper context by summarizing world news of the Sputnik I era as follows: "Flu, flu, flu. Crisis, crisis, crisis. Beep, beep, beep!"

Ten or 20 years from now, men may be navigating outer space, may be landing on the moon or on Mars. Such feats would also be neat scientific tricks, or great scientific accomplishments. Take your pick. But the news would remain essentially unchanged. Twenty years from now we might summarize the world affairs by saying, "Sickness, sickness, sickness. Crisis, crisis, crisis. Mars, Mars, Mars!"

Amazing deeds are being done and will continue to be done. Nations and individuals will win spectacular acclaim or notoriety. Unstable people, the giddy and the superficial, will be catapulted from one extreme of frenzy to another, as they always have been. Meanwhile, the old problems remain. And they can be solved ultimately only by those who work steadily, quietly, persistently, for the public good. A prosaic electric drill is still a better tool for excavating teeth than a spectacular explosion.

Few people were startled by what transpired at the National Association of Dental Auxiliaries meeting in Atlantic City on October 3, 1956. There were no planetary or cosmic "beeps" to celebrate the event. But the dental profession knows that here was another of those quiet, persistent steps along the road to public betterment. It has long been recognized that the influence of a good wife is an incalculable force in a man's affairs. Women have proved their capacity to stand beside their men—not merely behind them—in every undertaking of value. Through the active comradeship of dedicated auxiliaries, the profession of dentistry will be better able to achieve the ultimate ends that all have at heart.

The word dedicated may seem a little pretentious; however, the profession as a whole, and that includes auxiliaries, can go forward successfully and can fulfill its obligations as a profession successfully only in a spirit of dedicated service.

This type of service is not easy. There is still too much truth in the ancient theological maxim that man is prone to weakness and evil rather than to strength and goodness. Combining into organiza-

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tions does not guarantee integrity, though it does augment strength.

In my day I have said some harsh things about dentistry—the profession to which I believe I am dedicated. And I would like to repeat some of those statements in the hope that members of the N.A.D.A., and anyone else who can profit by them, will be alerted to some of the potential weaknesses with which almost all organizations must sooner or later be called upon to cope. While speaking to the First New Mexico Working Conference on Dental Health, I said:

> Although the dentist today serves his patients well, he serves his profession and himself indifferently. He works at cross purposes with those of his fellows who are keeping in close touch with current developments in public health and with preventive and controlled methods of dentistry. The philosophy of dental science . . . implies a compulsion on the part of the profession to recognize distinctions that have been overlooked, to disentangle beliefs from a confused jumble and to purge the irrelevancies of dental practice. . . . Inadvertently, the dental practitioner may become a stumbling block to the progress of the profession and a potential liability to the dental health of the public. Besides contributing in such incidental ways to the limiting and even undermining of the stature and potential effectiveness of the profession, otherwise conscientious practitioners may, and sometimes do, put difficulties in the way of valid and laudable dental programs. In general, the reason is failure to understand the methods by which community groups can organize and work effectively toward desirable common goals. More specifically, the local dentist's failure to grasp the principles of group activity may express itself in the fear that some sort of statist, socialistic measure is being proposed. He may doubt the motives of local and state health departments. Or he may fail to understand—and, therefore, to accept—the policies propounded by state and national dental organizations.

Among other things, this means that there is no room in a dedicated movement for the complacency and self-satisfaction which can settle like a fog around a working group and utterly blind them and smother their efforts. There is no room for petty self-seeking, for political opportunism, or for fear. The profession of dentistry cannot stand still. The ladies' auxiliaries have involved themselves on a national scale in what must be a continuing and even hazardous exploration. The profession is separated from the good it seeks by a sort of jungle. And a path must be hacked through it. This jungle is a wilderness of selfishness, stupidity, ignorance, opportunism, and plain indifference—the same old enemies of all progress—and dentists must constantly be alert for both danger and opportunity.

Dedication involves more than the willingness to bind one's self to act. Out of the pressing need for an effective, well-concerted program both locally and nationally arises the necessity of discipline. For the individual auxiliary member, just as for the individual practitioner, part of this discipline is the obligation to assume responsibility for self-education. Knowledge must precede any well-directed action. When dental public health is involved, this knowledge is not restricted to technical dental concepts. Ideally, it must extend to group psychology, public relations, the concepts and standards of other professions such as medicine and education—indeed, to a whole complex of such factors too extensive to specify in detail here. By way of illustration, it should be pointed out that, however good the proposed plan for public betterment, people are not apt to accept it ready-made. The chances for its acceptance are enhanced in proportion as the people for whom it is intended feel that they are its creators. The technical ability to devise a good plan, therefore, is not enough. Equally important is an understanding of how individuals and groups function.

Another aspect of this discipline is the auxiliary's obligation to work in harmony, at all levels, with the dental society. In the area of dental public health this means that any auxiliary program should

have the firm approval of the society. Strong liaison must exist at all levels—not only, of course, to forestall conflicting efforts, but also to assure to both society and auxiliary the maximum of mutual assistance.

I have studied with care all the material available to me concerning past activities of dental auxiliaries. What impressed me most was the great variety of technics and programs already utilized by auxiliaries in various parts of the country.

It might be helpful if some of these projects were listed, with some additional suggestions. They constitute a pool from which any group may draw.

Any auxiliary which has not already tried raising funds for scholarships might well be encouraged to try it. There is probably no better road to dental health education for the public than dental health education for school children. This education can be brought to them at least in part by public school teachers. It is true that teachers and public school administrators have their hands full with purely academic problems. A great many teachers, however, are willing to render their pupils the sort of service the dental profession would like to see them render. One way in which they can be helped is to provide scholarships—as at least one auxiliary already has—for school teachers taking dental health education courses during the summer. The scope of even one teacher's influence on the dental health education of children is almost incalculable. Her words may be like stones dropped into a pond, sending out ripples that agitate the water from shore to shore.

Another good educational investment is in worthy dental students facing financial difficulty. One of the great needs of the profession is for more dentists with good training, good intellect, and good character. A very modest scholarship to be paid back later with minimal interest charge can be just the help needed to encourage and retain the sort of talent needed. This sort of scholarship-loan has been tried in various fields, and the record indicates a very high percentage of repayment.

The support of auxiliary personnel during the period of training is also worthy of consideration. Merely to keep professional goals in sight during the conceivable future requires more extensive and more intelligent use of auxiliary personnel. The dentist, like the physician, needs more hands. Only a short time ago the physician delegated to the graduate nurse the duty of giving certain hypodermic injections. And the process has not stopped there. More and more physicians are gradually detailing more and more of their services to their competent trained assistants.

The present day dental office cannot be compared with that of 25 years ago. Nor can it be compared with that of 25 years hence. The dentist needs more hands to free himself of administrative, laboratory and technical duties so that he may spend more time performing professional services in the operating room. The demand for dental service is increasing, the population is increasing, and the number of dentists being trained is not increasing proportionately. The dental profession must, therefore, have courage to change with a changing world. To provide scholarship aids, therefore, for dental hygienists and dental technicians would help extend the scope and effectiveness of the profession.

It is not necessary to catalogue specific ways of raising money; however, one effective method to secure funds for scholarships, or for any other philanthropic purpose related to dentistry, might be a metal scrap collection. In 1956 the women's auxiliary of the Michigan State Dental Association secured $3,669.10 by collecting discarded amalgam scrap.[1] In the last 20 years, Wiscon-

1. Applegate, Carrie W. History of the women's auxiliary. J. Michigan D.A. 39:150 May 1957.

sin and Texas auxiliaries raised a combined total of $35,166.32.[2]

Besides contributing to the general progress of dentistry by providing scholarships, auxiliaries have a great function in what might be called public relations and also in direct contributions to dental health education. As members of health councils, church groups, other auxiliaries, P.T.A.'s, and social and civic clubs, the ladies of the dental auxiliaries can help to create a climate of receptiveness for professional ideas and programs. This does not mean aggressive obtrusiveness of any kind. There are more than enough legitimate occasions when individuals or groups will welcome a professional insight from anyone who is competent to speak. On such occasions, readiness counts. For example, in many localities fluoridation programs are highly controversial. What intelligent member of a group, interested in her children's welfare, would not at least listen to a skillful or to a competent exposition of the facts? Here is a measure of public health which, while it may be delayed, cannot possibly be defeated. One obligation that all members of the dental family have is to be informed about fluoridation and to share the information wherever possible. Similarly, such problems as enlightening the public concerning issues of dental law, appropriation of public funds for dental health programs, care of the indigent and those confined to home and institutions, need to be attacked from all sides. Dental auxiliaries certainly can assist in this work, through individual and group effort, provided that members are adequately informed.

To help auxiliaries acquire that necessary information, more joint meetings of a scientific nature might be held in conjunction with the ladies' auxiliaries.

Among other activities which I have previously advocated as local responsibilities of the profession, are a few for which auxiliaries might contribute effectively:

1. Educating the public by local programs on the importance of dental health.
2. Speaking to students, teachers, and parent groups.
3. Assisting teacher training groups.
4. Advocating the inclusion in public school curriculums of more pertinent current material on dental health and preventive measures.
5. Assisting in organization of student health councils in each high school and in presentation of dental plans to these councils.
6. Establishing a program of training adult leaders and teachers in dental health facts. Among the projects which some auxiliaries have found helpful are:

   Kindergarten education

   Puppet shows

   Flannel board displays

   Clinics for retarded children

   Equipping of clinics in homes for incurables

   Raising funds by style shows and luncheons

   Providing dental health films for school libraries

   Assisting in programs during National Children's Dental Health Week and National Health Week

   Providing P.T.A. programs for mothers
7. Placing in dental offices, in schools and in libraries, additional literature from the American Dental Association.
8. Making available to children of all age groups the many types of dental health literature available from the Association.
9. Laying the groundwork for and assisting in the development of local workshop programs. During the past ten years in Tennessee, approximately 200 dentists have met once a year for what is called the Tennessee Dental Health Workshop program. At this meeting certain problems of dental health among the people

2. Women's auxiliary clarifies scrap amalgam project. Washington D.J. 26:8 Sept. 1957.

of Tennessee are discussed. About 50 typewritten pages of suggestions and recommendations have been collected, many of which could be carried out on a local level with the help of ladies' auxiliaries.

10. Developing better medical-dental relationships.

11. Encouraging continuous vocational guidance programs for young men and women to be instituted and conducted by the local dental societies in cooperation with the educators, in order to interest more personnel in the study of dentistry and dental hygiene.

12. Establishing textbook committees and working in liaison with state dental associations in correlating a standardized program for teaching dental health in public schools of the state, civic clubs, local groups, P.T.A., radio and newspapers.

13. Encouraging dentist-husbands to become active in politics and to serve actively on boards of health, and with institutions and groups interested in health programs.

14. Learning what alienates patients and causes them to change dentists.

15. Surmounting the greatest obstacle in the dental health program—the profit motive in the handling of school lunches.

16. Developing some kind of liaison between teachers and local dentists in order to provide children with authentic information.

17. Creating greater public appreciation of the value of dental care, but not so much that demand exceeds the services available.

18. Helping to make dentistry heard more effectively on the national level as well as on the local level. The National Association of Dental Auxiliaries, with its potential membership, may be a very effective means.

19. Advocating that, wherever possible, local funds should be utilized for creation and maintenance of community programs. When local funds are inadequate, state and federal funds may be sought. Public health, welfare and voluntary organizations should be asked to budget part of their funds for dental health.

The following principles might be helpful to persons promoting dental health programs:

1. A program cannot be planned for other people. A program is planned with other people.

2. When others are asked to help plan a program and to take responsibility, it will be found that the community and those people involved will invest more time and money in the program than they will in any plan which has been sold them for which time and money were requested.

3. People are not convinced by what other people tell them. They are convinced by what they find out for themselves.

4. For dental health programs, the services and the good will of people who have not been worked to death in other programs must be sought.

5. Community planning is slower, but its results last longer.

6. Every health service can be a springboard for sound education.

At this point it could be asked, "But what is the function of the National Association of Dental Auxiliaries?" It is true that emphasis has been placed on what local auxiliaries, or members of local auxiliaries, might do to further the long-range objectives of enlightened dentistry. This is partly because the real work must be done at the local level. If it is not done there, no national organization will avail. The American Dental Association can be strong only if the state dental associations are strong, and the state association is strong only if the local associations are strong.

Local effort has been dwelt on also with the object of suggesting its scope and complexity. The greater this scope

and complexity, the more need there is for clear-sighted evaluations and comprehensive policy making. This should be the function of the N.A.D.A.: to collate, integrate, inform—in short, to act as a pilot group and to initiate policy. State and local auxiliaries have the responsibility of implementing national policies at state and local levels. There should always, of course, be a two-way flow: upward from the local to the national level—a pause there, so to speak for deliberation—then downward from national to local level. The lifeblood must be kept circulating if all the tissue is to remain healthy.

As I said at the beginning, launching an organization like the National Association of Dental Auxiliaries produces no "beeps" from outer space. The big telescope will not track it in its orbit. But this means only that it is not a satellite of Earth. Instead, it is a satellite of mankind—about whom the members revolve and whom they serve. And in the steady progress of that service lies the deepest satisfaction and the final praise.

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Legal problems in dental practice

John G. Rooks, L.L.B., San Francisco

Partnerships, groups and associations in the practice of dentistry create many legal problems, a few of which will be touched on briefly in this article. It appears that consideration should center around two major fields of law—contracts and torts.

This is not to suggest that all the legal problems a dentist will encounter will be in these two categories but merely to say that neither the entire field of law, nor these two fields extensively, can be covered.

Because of the nature of law and its complexity, and the fact that statutes of the many American jurisdictions vary, only what are considered zones of danger in most states and territories will be pointed out. Where there are two general opinions as to a principle of law, that one which carries the weight of authority, or in other words, is held by the majority, will be quoted. Recognition is given to the fact that the opinion set forth could well be held to the contrary in a specific area.

No one lawyer can know and carry in his mind all of the laws of his own state, to say nothing of all the states and territories, therefore it is necessary for him to find or "look up" the law and court decisions pertaining thereto and be able to interpret it properly and to apply it. It should also be recognized that what may be accepted today may, through a court decision or legislative action, be changed tomorrow.

It is unfortunate that in many instances risks are not recognized by dentists and legal counsel is not sought until it is too late. It is then necessary to consult an attorney in order to get out of trouble when

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it might have been possible to have prevented the trouble from arising.

Dentists—indeed, all men of science—generally are quite shocked at their first visit to a court either as one of the litigants or as an expert witness. The doctor on the witness stand finds himself participating in what is both a fight and public performance, a performance in which "stage presence" and poise are not less important than erudition, in which quick thinking is essential, and simple, lucid statements are more likely to be appreciated than scientifically definitive answers bogged down with specification and qualifications.

Practicing attorneys are so accustomed to the trial process they do not realize how alien and even repulsive it may seem to the members of the health professions. The dentist is accustomed to being listened to deferentially when his opinion is sought by a colleague or a patient. He is by nature an independent individual. In his practice he is his own boss; he takes orders from no man. He is accustomed to making investigations and pursuing the truth by his own methods.

In the courtroom everything is changed. He is permitted neither to ask pertinent questions nor to express an opinion freely and in his own way, so as to assure accuracy, even though he was sworn to "tell the truth, the whole truth, and nothing but the truth." He is told when to speak and when to stop speaking. He may be asked to express an opinion on a hypothetical statement of fact which he is convinced gives a wholly distorted picture of the actual case at issue, and he will not be allowed to object that he does not consider the stated facts to be true. Instead of having his views received with the deference and respect to which he is accustomed, he is likely to be disconcerted, if this should be his first experience, on cross examination to hear his professional competence and even his intelligence and his pronouncements ridiculed and misstated. If he is not extremely careful, his statements may be exposed as absurdities by a lawyer displaying a surprising familiarity with the scientific learning and literature on the subject.

Many lawyers are likely to regard members of the healing professions as men who presumably know a lot about the human organism but who are sadly ignorant of the complexities of social organization and who, therefore, are inclined to be impatient of the delays and red tape which legal and political action involve. Many doctors, in turn, see the lawyer as a man absorbed in petty formalities and technicalities. Because the distinction between the advocate's function and that of the scientific investigator probably has never been pointed out to the doctor, he is likely to regard the lawyer's willingness to serve almost any client as vaguely meretricious. This feeling is reciprocated by lawyers who have observed too many expert witnesses displaying a conscious or unconscious partisanship ill becoming representatives of the scientific tradition. Rarely do the lawyers reflect that it is the prevailing legal procedure which forces expert testimony into a partisan mold.

GENERAL CONTRACTS

Little need be said here about the general law of contracts other than that it is an integral part of the practice of dentistry and of our daily lives. It is virtually impossible to transact any business or enjoy any social life without agreements, either oral or written. The relation of patient and doctor is contractual in character, two consenting minds being necessary to create the relation. In other words, it is voluntarily assumed, not imposed by law as a matter of duty and public policy, and without it there would be no practice of dentistry.

Oral or verbal contracts are legal and binding in some instances and not in others. The careful, prudent businessman will insist on all such agreements being

reduced to writing. This is not meant to include those for normal dental care in which there appear to be no special conditions. This should be done by a person trained in the law and in the use of legal phraseology. It is surprising to note the differences in interpretation that can develop within a matter of days as to what had actually been agreed on when the contract has not been reduced to writing.

Contracts may be said to be (1) express, or (2) implied, and the latter may be divided into (a) those in which the agreement is a natural and a reasonable inference from the circumstances of the transaction, and (b) those where the law imposes the duty as a matter of public policy irrespective of the real intention of the parties. An express contract is one in which the parties have declared orally or in writing the terms of their agreement.

An implied contract is one in which the terms of the agreement are an inference of fact or law deduced from the conduct of the parties in relation to a subject matter, or imposed by law as a matter of duty. Thus, under (2a) there is an inference that a person who receives the benefit of professional services promises to pay the reasonable and customary charges therefore. There is the further inference that the dentist rendering the care, assuming he is a general practitioner, has that same degree of knowledge, skill and ability as the ordinary or average general practitioner in the same or similar areas and that he will apply that same degree of skill, care and judgment in treating the patient as would be used by the average general practitioner treating the same patient for the same condition in the same or similar areas. Every dentist understands that in the event that the practitioner is a specialist, his degree of knowledge, skill, ability, care and judgment must, at least, be equal to the majority of others specializing in that same field who practice in the same or similar areas.

Every dentist is urged to retain and use competent legal counsel when any important business undertaking is being considered. His attorney will have all the necessary information as to competent parties, consideration, objects, the several types or forms of contract, and the Statute of Frauds, most of which is unknown to the average dentist.

One further suggestion should be made before leaving the subject of contracts. It pertains to those things for which one should look on examining a contract. Briefly they are: Assurance that the written contract embodies all the terms agreed on by the parties (that everything agreed on verbally, and nothing more, has been reduced to writing); that the contract has a lawful object and a proper consideration; that the terms are set forth clearly, definitely, intelligently and precisely; that it contains no ambiguities or vague and doubtful words and phrases, and that the written instrument correctly and accurately expresses one's conception and understanding of the agreement. If the instrument does not meet this test it should not be signed; it should be referred to an attorney.

ASSOCIATION, GROUPS AND PARTNERSHIPS

Association of two or more dentists, primarily to share rental and other costs, is not new to dentistry, neither is it a practice which has had widespread acceptance over an extended period. More recently the trend seems to be gaining, with each year seeing a greater number of practices established on some form of "share the expense" basis. In addition, it appears the number of full partnerships and those arrangements termed "group practice" are on the increase.

There are certain advantages through partnership arrangements and certain additional hazards or danger zones created for those so practicing. Volumes have been written on contractual and partnership agreements. If they have not pre-

viously done so, dentists who have entered into partnership, group practice, or association agreements are urged to investigate the many legal ramifications of such agreements most thoroughly. It is not impossible that some dentists may have assumed or created legal liability which did not exist previously or of which they are not aware. If such a situation has been brought about, and the interested parties have the data, they should experience no difficulty in taking whatever steps may be indicated to protect themselves and to avoid further involvement.

The principles of law pertaining to partnerships and agencies were developed primarily to govern commercial transactions, and only a portion of them apply to joint activities of members of the healing professions. Space will not permit anything other than the most cursory treatment, but there are points which should be recognized as they are vital to the successful practice where partners and associates, and where employees, on occasions, serve as agents of the partnership. Brief mention also must be made of how partnerships may affect third parties; the danger of creating an ostensible partnership or one by estoppel, and notices to third parties on dissolution.

Partnership law as applied to the professions is evolving and undoubtedly will be fairly well defined within a few years. In the meantime, the dentist and his legal adviser must struggle with established legal principles which have evolved through commercial transaction; definition of words as accepted by most people, and the meaning of certain words used by the professions which at times are in contrast, if not actual conflict, with the meaning as used in the general business world . . . for example, "associates" or "association." One of the definitions of "associate," according to Webster, is: "To join as a friend, companion, partner, or confederate; as, to associate others with us in business." Generally speaking, the commercial world thinks "partner" when one speaks of an "associate." In the professions "associate" often is used to describe a licentiate who is sharing a portion of an office, and who may be utilizing the services of certain office personnel, equipment and, in some instances, may share in the distribution of profits or losses.

Extreme care should be exercised in spelling out exactly what is meant by the term "associate" in any agreement which may be made. First, the agreement should be reduced to writing. Second, the writing should describe the relationship and indicate clearly whether the associate is a full partner, a partner limited in scope, with such limitation defined (not to be confused with a limited partnership), a lessee, or an employee. Such a precaution may save all parties to the agreement money, time, and embarrassment.

An example of what can happen when there is a failure to develop a complete understanding is illustrated in a case which came to the attention of the author three or four years ago. "A," a recent dental graduate, associated with "B" who had an established practice. "A" understood he was to have certain patients referred to him by "B" and was to render care for those who might come to him through any other source. "A" was to share on a percentage basis both the cost of operation and in the gross fees for care rendered by him. "A" claimed that he learned some patients who had been referred to him by other practitioners were not coming to him but were receiving care either from a third practitioner, "C," who was also an associate of "B," or from "B" himself. The association between "A" and "B" was dissolved at which time "A" asked for the records of those he considered his patients. "B" objected on the grounds that "A" was nothing more than an employee working on a percentage basis and that he had no right to any records.

There was evidence that "B" considered, or should have considered, the arrangement something other than that

of master-servant as he had not made deductions from the earnings of "A" for Federal Income Tax, Federal Old Age and Survivors Insurance, California Unemployment Tax, nor for California Unemployment Compensation Disability; had not paid his portion of the tax; had not deducted or submitted "A's" portion, nor did he report the fact of "A's" employment or earnings on his ("B's") Workmen's Compensation Insurance audit. Other evidence was that statements for care were rendered on printed billheads carrying the names of both "A" and "B." All this could have been avoided had "A" and "B" had a clear understanding of the relationship, with that understanding reduced to writing.

In this instance both men lost. "A" had to retain counsel and take time to prosecute a civil action against "B." "B" had to retain counsel for the defense of that case plus those entered against him by the United States government and the State of California. "B" also was faced with back taxes, interest, penalty, fine, and attorney fees, all of which added up to a considerable sum.

SHARING PROFITS

A partnership is an association of two or more persons to carry on as co-owners a business or profession for profit or to conduct some joint enterprise. This definition carries the implication that a partnership arises only in cases where the parties intended that result. Although such an inference is true in a general sense one should always keep in mind that there are exceptions. Even though a person may not have intended entering into a partnership, a court may construe that a partnership results from the things he does, regardless of his intention. One should be cautious in entering into any agreement that permits him to share in the profits from a business or a practice unless he intends that a partnership shall exist. Sharing of profits is a danger signal even though, in itself, it is not usually sufficient to prove partnership.

A person should not permit others to represent him as a partner, since he might be held liable as a partner to those who act in reliance on such representation. Under such circumstances he could become a partner by estoppel. One cannot be charged as a partner by estoppel unless he has been at fault in allowing others to represent him as a partner. His liability as a partner will be limited to those who are misled by the representations.

Generally speaking, in a partnership the intent is to engage in business for a series of transactions which the parties expect to result in mutual benefit. When there is an express agreement, the parties initially specify a definite time involvement, or they may leave that factor indefinite. Where there is no actual partnership agreement, the law may nevertheless impose similar consequences by referring to the activity of an "ostensible partnership." This may result in recognition of some but not all similar rights and liabilities between the associates themselves and between third parties. On specific facts a court may hold that the parties will be treated as if there were an actual partnership. It should be noted that not all types of joint activities with the expectation of benefit should be classified as partnerships in either the popular or the legal sense.

Although application of the principle is often apparent, it should not be forgotten that the word "partnership" is a relative term and does not apply with equal force at all times and places for all purposes. For example: several dentists might form an association and agree to lease office space, purchase furniture and equipment, and provide treatment by any one of them for any patient with the patient's consent. They will make payment jointly for all expenses, including a receptionist and assistants, and divide the profits, if any. It is immaterial that there is inequality in the amount contributed

by each or in distribution of profits. This is an actual partnership.

It is said that to the others each partner is both principal and agent and that each partner is liable for acts of the others. This liability is qualified and limited to acts within the scope of the business. Thus, if one of the partners takes a patient, a Mr. "X," on a Sunday automobile ride and causes injury by negligent driving, the other partners clearly are not liable. Suppose one dentist treats Mr. "X" in the office, however, and, without negligence on the part of the dentist, the patient exhibits a serious condition and the dentist drives him to a hospital. On the way the patient is injured as a result of the negligent driving on the part of the dentist. There is a possibility that the act causing injury would be considered as coming within the scope of the business, to make others of the partnership liable, depending on conditions of a given case and the law of the particular state. In the event the dentist negligently injured Mr. "X" while treating him in the office, the act was clearly within the scope of partnership activities for which the other partners may be liable although they had no dealings with Mr. "X." Difficulty is sometimes encountered in determining what facts fall within the partnership enterprise. In such instances, adjudication by a court is often required. It is emphasized that when there is an actual agreement between the parties, each partner is liable for the acts done within the scope of that agreement.

It should also be recognized that, in addition to being responsible for his own acts and omissions, a dentist, in his everyday life and in his practice, encounters instances in which he also may be responsible for the negligent acts and omissions of others committed within the course of employment or within the partnership scope. "Let the master respond" . . . that is, in damages. Or to state it in another manner: the master is liable for the torts of his servant, when they are committed in the course of employment. This has been a well-established law for more than two centuries and has been extended to apply with equal force to agents of the master. If any trend is observable, it is in the direction of increasing the scope as well as vigor of the doctrine.

There are occasions, of course, where partners no longer desire to conduct their practice or business as an association. Some just quit, and from all outward appearances nothing happens. Others find themselves faced with the extremely important question of "How do we go about dissolving the partnership so as to relieve ourselves of any future obligation or liability?" There are also those questions which are invariably presented on the death of a partner.

When a partnership is dissolved, the mutual agency theretofore existing as to the partners themselves is ended. This is not necessarily true in respect to the interest of third persons. A great variety of cases show that former partners sometimes act, intentionally or unintentionally, as though the firm still existed. As to future dealings between a former partner and third parties, arrangements between the former partners may not be sufficient. There may be a continuing power, although a duty not to exercise it may exist. The mutual agency should be terminated, not merely as a matter of personal reliance but by legal revocation of that authority.

In such instances it is advisable, if not imperative, to retain competent legal counsel. Steps to be taken in dissolving a partnership depend largely on: the nature of the agreement; the size and scope of the business; the number of partners; its financial condition; whether it is being dissolved, or a partner is merely withdrawing from the association, and many other points. Those who have dealt with the partnership are entitled to actual notice of its dissolution, and the former partners will be in a better position for

having given such notice. Those to whom notices should be sent include patients of record, supply houses, laboratories, and others furnishing special services, or with whom the partnership carried on trade or maintained charge accounts.

It is hoped that this paper will assist in causing a great number of dentists to realize the importance of seeking competent legal counsel prior to entering into agreements, signing contracts, or taking other steps which have vital legal implications. If so, it shall have served its purpose.

A.D.A. Relief Fund: a voice in the wilderness?

Louis M. Cruttenden, D.D.S., Chicago

The idea of establishing a "benevolent fund" to help dentists who become aged, infirm or financially destitute had its origin about the turn of the century and the $4,000 which remained from a fund of $15,000 raised to help the dentists in San Francisco after the fire in 1906 provided the impetus to what is known as the Relief Fund Program. With a few more than 700 members in the National Dental Association, however, little enthusiasm was generated. The Relief Fund was relatively dormant until the National Dental Association was reorganized in 1913. At that time, interest in the Relief Fund was rekindled by using the Christmas seal idea to solicit contributions for the Fund.

THE FIRST GOAL

The seal campaign has been carried on annually since then, but the Relief Fund experienced some rough going for the next few years. In 1921, it was agreed that when the principal reached $100,000, only the interest from this sum, plus contributions received each year from the seal campaign, could be used for making grants for relief purposes. The goal of $100,000 was reached in 1924 at which time the policy was changed so that only the interest from investments could be used for the payment of relief grants and, further, that component and constituent societies would be required to participate in the program by making recommendations on applications and agreeing to contribute an equal amount towards the total grant.

The first grant in which the component and constituent societies contributed an equal share was made in 1924. During that year, a total of $2,690 was paid to seven dentists. Ten years later, 27 grants were made for a total of $4,980.

SEPARATE STATE RELIEF FUNDS

Few constituent and component societies had separate relief funds, so the source of grants for these societies was from their general funds. In order to encourage the maintenance of separate relief funds,

Presented before the annual meeting of the California State Dental Association, April 20-23, 1958.

Assistant secretary, American Dental Association.

the American Dental Association agreed to refund to the state societies one half of the money contributed by their members to the annual seal campaign with the provision that such money be placed in a state relief fund. Thus, added interest was created for the relief fund program with the result that the relief funds of both the individual state society and the American Dental Association continued to grow each year.

NEED FOR CHARITABLE TRUST

Prior to World War II, little attention was given to the tax status of the relief fund. The American Dental Association, as a not-for-profit corporation, is exempt from payment of any federal income tax. Individuals who made contributions to the American Dental Association could not include such donations, however, as deductible items in making federal income tax returns. Higher tax rates and the fact that contributions for the relief fund could not be deducted on the federal income tax were the chief factors in prompting the House of Delegates to establish a charitable trust for the American Dental Association Relief Fund as a separate corporation. This action was completed in 1948, and now contributions made to the Relief Fund are deductible for income tax purposes and the Relief Fund is also exempt from payment of federal income tax.

MANAGEMENT OF FUND

The management of the Relief Fund is under the direction of the Council on Relief of the Association, and the five members of this Council automatically are trustees of the American Dental Association Relief Fund. The acts of these trustees are subject to the control of the Association's Board of Trustees and House of Delegates. In 1948, the administration of the Relief Fund was moved to the Central Office where it has been operating under the Office of the Secretary of the Association. Rules of the Relief Fund, under the Indenture of Trust, provide that grants may be made to any dentist and dependents and the amount of grant is determined by need rather than by years of membership. Relief recipients now receive, on the first of each month, one check with a statement listing the societies that have shared in making the grant.

STATED PURPOSE OF FUND

The highlights of the Relief Fund Program's development since the impetus it received after the San Francisco fire in 1906 have been outlined in order to provide a background for the present program and its limitations. Before discussing the Relief Fund Program further, let us examine the purpose of the fund as it is expressed in the Indenture of Trust:

> to render financial aid to members of the dental profession and their dependents (including former dependents of deceased members of the dental profession) who, because of misfortune, age or physical or other disabling conditions are not wholly self-sustaining, and to receive, accumulate, invest and expend moneys and property for the attainment of such object.

Let me give you an idea about some of the people who were given assistance during 1957. A total of 75 persons were over 65 years of age, and all of them were totally disabled and unable to support themselves. This group is not eligible now for any benefits from the O.A.S.I. program of the Social Security Act. Here are the reasons for grants that have been given to persons under 65 years of age: assistance was provided for eight widows of dentists, four persons were paralyzed from poliomyelitis, seven were afflicted with diseases of the central nervous system such as multiple sclerosis, four were classified as mental cases, three people had malignant growths, four were in-

capacitated by heart disease and the remaining persons were totally disabled from tuberculosis, impairment of movement due to arthritis or circulatory disorders.

Grants are made on the basis of total disability or to aid in rehabilitation. Although the grants that are made to persons in the older bracket are not supposed to be in the form of a pension, yet practically, it has been found that in many such instances, payments are continued until death, but the Council reviews the case each year.

All the money accumulated in the Relief Fund has resulted from contributions. There has been no other source of principal. The Indenture of Trust specifically limits the source of payments for assistance grants to funds that have been derived from income on investments. The cost of Relief Fund investments at the close of 1957 was approximately $1,000,000, and the market value on February 15, 1958, was about $1,500,000. The income from investments in 1957 was $61,710, which was about $2,800 greater than was received in 1956. This income represents a yield of 6.04 per cent based on cost and 4.06 per cent based on market value. After the 1957 grants, which amounted to $48,817, were paid, a balance of $143,763 remained as accumulated surplus. This amount is available for payment of grants.

POLICY ON MATCHING GRANTS

Prior to 1955, the cost of administration, including expenses for the annual seal campaign, was paid out of money held in the Relief Fund. For the last three years, the American Dental Association has borne the entire administrative cost of the Relief Fund, an activity that actually represents an annual contribution of $18,000. As a result, about $43,000 has been added in a three year period to the surplus that is available for the payment of grants. In contrast, for the previous six year period, the amount paid out for grants exceeded income by about $65,000. Probably the greatest factor contributing to this deficit was that, for three years, the A.D.A. Relief Fund paid two-thirds' share of each grant instead of an equal matching amount. The first year under the two-for-one policy, the amount paid out for grants exceeded income from investments by better than $18,000, but, at the same time, the principal was increased $22,000 over the previous year from more generous contributions in the seal campaign.

GRANTS IN 1957

Since the Relief Fund became a separate corporation in 1948, the amount contributed each year has shown an increase over the previous year. More than $128,000 was collected in 1957. The growing interest in the Relief Fund Program, as shown by the results of the campaign, had its effect on the number of applications for assistance. One hundred and seventeen persons received assistance from the Relief Fund in 1957 as compared with 73 in 1949. The commonest grant was $50 per month, and it was matched by constituent societies so that 41 persons received $100 per month; 43 persons received combined grants of less than $100 per month. In each instance, the amount of the grant is determined by the component or constituent society. Unfortunately, the amount of the grant is limited, in many instances, by the size of the constituent society relief fund rather than by the needs of the individual.

INCOME OF STATE RELIEF FUNDS

Relief funds of constituent societies have been maintained from income derived from various sources such as: (1) refunds from the American Dental Associa-

tion for contributions made to the annual seal campaign, (2) a per capita allocation from each member's annual dues, (3) sale of amalgam scrap that has been collected from dental offices and (4) interest on bonds, stocks or bank accounts. As far as is known, grants made by constituent societies are paid from principal rather than from income from investments. Each constituent society is required to submit an annual financial statement of its relief fund to the Council. Only 20 societies have relief funds of more than $10,000. Contrary to general belief, component societies in only ten states share in the grants made by the constituent societies. This limited participation can be understood when one considers that out of 443 component societies, only 70 have more than 200 members. It has just been reported that the Maine Dental Society has received a bequest of $50,000 for its relief fund.

RELIEF FUND SEALS

The Council receives letters each year on the use of seals as a device for stimulating contributions to the Relief Fund. It may be of interest to know that the American Dental Association was one of the first organizations to use stamps or seals in collecting funds for charitable purposes. Each year, the Association receives requests from many individuals outside of dentistry for seals. Bert B. Otto, of New York, recently presented the Relief Fund with a scrap book containing samples of all the seals issued, the signature of the designer, the engraver and the printer. This collection is on file in the Library of the Association in Chicago.

CAMPAIGN AS A SOUNDING DEVICE

Each year, letters are received protesting the use of seals in soliciting contributions to the Relief Fund. Some object to the design, others do not approve of any form of solicitation. The Council has considered the points which have been raised and has come to the following conclusions: (1) the use of seals as a device for soliciting contributions has been successful, (2) seals have been designed to avoid the Christmas motif since contributions may be made at any time of the year, (3) seals are designed to avoid the idea of charity. Suggestions for making individual contributions and for including the Relief Fund in bequests in wills have not brought forth any sums worthy of mention.

O.A.S.I. AND RELIEF FUND

Prior to 1955 when the House of Delegates rescinded the policy of the Association opposing the inclusion of self-employed dentists under the Old Age and Survivors Insurance program, the Council was besieged with requests that the Association make such rescission. One of the arguments advanced was that there would then be no further need of the Relief Fund.

The Council realizes that the O.A.S.I. program will have some effect on the Relief Fund, but it also believes that there will still be an important need for Relief Fund grants both to individuals not eligible for Social Security benefits and to individuals who need supplemental aid. O.A.S.I. has not eliminated the need for public assistance welfare programs as far as other segments of the population are concerned as may be demonstrated by the demand for assistance from county welfare boards that has continued since the Security Act went into effect in 1936.

O.A.S.I. also will not eliminate the need for Relief Fund grants, even after the full effect of its benefits is felt in 1966. One reason is the fact that there will still be two segments of the dental profession that will not qualify for any benefits under O.A.S.I.—the dentist who was over age at the time the program was

initiated and the dentist under 65 who is forced to retire because of catastrophic experience; another is the amount of the benefit itself. The maximum amount a dentist may receive under O.A.S.I., if he has retired, is $108.50 a month; if his wife is 65 years of age, the couple may draw a maximum of $162.80 a month. Experience indicates that these O.A.S.I. benefits will be helpful but not adequate, particularly in the light of continued inflation. The Relief Fund, therefore, must serve in its small capacity in good times as well as in times of recession.

EXPANSION OF PROGRAM

Some of the comments received by the Council say that since there is $1,000,000 in the Relief Fund, there is no further need for contributions. In the same mail come requests from state dental societies to expand the program, and it is assumed that perhaps the reason for such proposals is the fact that the Relief Fund does have a million dollars worth of investments. Several proposals have been suggested to the Council for modification of the Relief Fund program. In considering these proposals, the Council has kept in mind the following facts: (1) the Fund has no basic source of income other than from contributions; (2) any general economic recession would affect the size of contributions, the earnings from investments and the demand for relief grants and, in such event, a substantial reserve must be available for grants. Among the suggestions made are: (1) making low interest loans available to dentists who need such funds to rehabilitate their homes or practices as a result of an act of God or personal tragedy; (2) establishing and operating retirement homes for dentists, their wives and widows; (3) making grants to dentists who are victims of disaster and who have had their homes damaged; (4) discontinuing the annual Relief Fund seal campaign.

LOW INTEREST LOANS

Legal counsel is of the opinion that if it were decided to engage in making low interest loans or establishing a retirement home, an amendment of the Indenture of Trust would be required. Action of this nature would have to be submitted to the House of Delegates, and a two-thirds majority vote would be necessary for approval. As stated earlier, the Relief Fund is a charitable trust, and, as such, enjoys exemption from federal income tax. In addition, donations by individuals to the Relief Fund are deductible for income tax purposes. The making of low interest loans is a business arrangement with an obligation for repayment. Such an activity, even with a poor credit risk, would not be considered an act of charity and would endanger the Relief Fund's income tax status. Therefore, the Council does not favor making low interest loans available to dentists under any circumstances. The Small Business Administration will make low interest loans to victims of disasters to rehabilitate a business, such as a dental practice. In the event of a major disaster, federal and state funds are available for rehabilitating a home.

RETIREMENT HOME

In setting up a Valhalla for dentists, the Council was concerned about the effect of such an activity on the tax status of the Relief Fund. Legal counsel is of the opinion that although the establishment and operation of a retirement home for dentists would require an amendment to the Indenture of Trust, it would not affect the tax status of the Relief Fund, because it would be considered as a charitable endeavor even if the resident were required to pay part of the cost.

A report on the operation of a retirement home owned and maintained by a fraternal order indicates that the property is valued at $1,500,000, and expenses

for maintenance of 191 residents for a year were $176,850. The average age was 80.5 years, and the residents consisted of 134 women and 57 men. Property in one of the southern states, consisting of 28 acres for a dormitory-like building capable of housing 240 young persons, has been offered to the Association for $900,000. Information has also been received about facilities in Youngtown, Arizona, for elderly people who have retired. Property is available to individuals in Youngtown and, thus, sponsorship by the Relief Fund would not be involved. In light of the cost of property, personnel, equipment, services, recreation and medical care, it is obvious that the Relief Fund does not have the resources to undertake such a huge project. In addition, churches, fraternal orders and the government are maintaining homes for the aged throughout the country. It would hardly seem necessary for a professional association to provide an institution where its members might live in their retirement.

DISASTER VICTIMS

The Rules of the Relief Fund provide that grants may be awarded for meeting emergency needs. Such grants must be supported by a constituent society in the manner prescribed in the Rules. An emergency grant may be made to a disaster victim on recommendation of the constituent society involved, and it must be followed by a full explanation of the conditions which necessitated the emergency grant. Only one such emergency grant may be made to an individual, but he is still eligible for assistance through the regular program. Opinions vary as to what is and is not a disaster and, consequently, the Council believes that the eligibility for either an emergency or a regular grant must be determined on an individual basis and then only when the procedure outlined in the Rules is followed.

A NEW GOAL

The Council believes the annual seal campaign is necessary (1) to build up an adequate reserve and (2) to help build up the relief funds of the state societies. There is a divergence of opinion on the amount of funds an organization should carry in reserve. However, the Council believes that a goal of $200,000, an amount equal to approximately four years' grants, should be available to meet any future demands for assistance. Adequate grants are not being made now in many instances because some state society relief funds are inadequate. Only when these state funds are built up, through the annual campaign, will more adequate grants be permissible. When the reserve available for grants has reached $200,000 and when state society relief funds are more adequate, then, the Council feels, will be the time to re-examine the Relief Fund Program and determine its future course.

LIMITATIONS

I have outlined, briefly, some of the plans that have been suggested for expanding the activities of the Relief Fund Program. Worthy as some of the plans may be, attention must be given to the finances that are available to put any such plans into operation. The principal of the Relief Fund reached $1,000,000 only this past year. The income amounted to $60,000, and if the Relief Fund had had to pay for the administration, the Fund would have just about broken even. It would be extremely difficult to secure a two-thirds vote in the House of Delegates that would permit the use of any of the principal.

At its last meeting, the Council set a goal of a surplus of $200,000 which represents about enough to pay grants at the present rate for four years. When this goal is reached, the Council will have experienced some of the effect of the

O.A.S.I. program on the Relief Fund. It will also have had a chance to view the extent of inflation. The Council is not willing to abandon the annual seal campaign until it can be demonstrated that there are sufficient resources available to meet the needs of the program. Payment of monthly grants of less than $100 could hardly be said to meet the needs of a person who really needs help. Although monthly grants of less than $100 might have inspired shouts of joy and hope in 1906, they would be cries in the wilderness of today's inflation.

Scientific Progress and Political Science • One of the most important problems facing political scientists today is the matter of their deficiencies in coping wih policy decisions affecting national security in an atomic age. Scientific progress is a remarkable aspect of the culture of our times, otherwise so material and profane.

Scientific progress should be universally approved of, at least by intellectuals, despite the extremely menacing nuclear monsters that have been spawned along the way.

The political scientist is all in favor of scientific progress in his own field but is concerned much more about the slowness of development in his field than about the possibly dangerous impact of the relatively simple findings he has made thus far. He is acutely aware of his failure to keep pace with the needs which a swiftly developing technology, fed by advances in other sciences, has imposed upon society. In a more private recess of his soul the political scientist worries also because his findings and discoveries do not really register in the way that they do in the other sciences.

In all the other sciences a significant finding is established as a fact to be reckoned with permanently by all workers in the field to which it pertains, at least until it is definitely superseded by some relevant but different finding. And there is something majestically impersonal about the march of events in the nonpolitical sciences. It can almost always be stated with assurance that if one scientist had not made a particular key discovery at a certain time, another would have done so within a reasonably short period thereafter. Such a statement does not detract from the credit due to the discoverer, whose merit apparently lies less in his special uniqueness of insight than in his position at the van of a movement pressing against the boundaries of knowledge . . .

No doubt there are fads in research, though the existence of such fads is probably less important than is the question of how rapidly these fads wax and decay. In political science the favored fixations tend to be too enduring even to be called fads, often lasting for a generation or more. *Bernard Brodie. Scientific Monthly 85:315-319 Dec. 1957.*

BUREAU OF PUBLIC INFORMATION

The nation's press comments on Association dentifrice testimony

The testimony of representatives of the Association regarding dentifrice advertising claims which was presented before a Congressional committee on July 17 attracted widespread attention in the nation's press. The hearing was conducted by the Subcommittee on Legal and Monetary Affairs of the U. S. House of Representatives. The chairman of the Subcommittee is Rep. Blatnik of Minnesota.

News stories on the statements of Association witnesses were carried to the nation's newspapers and radio and television stations on the wires of Associated Press and United Press International. Stories were also distributed by the Scripps-Howard Newspaper Service and by Science Service. Several newspapers and a number of advertising trade publications assigned special correspondents to cover the hearings. These included the Chicago *Tribune,* the Washington *Post & Times Herald,* the Washington *News,* Cincinnati *Enquirer, Advertising Age, Drug Trade News, Printer's Ink, Wall Street Journal* and *Radio & Television Daily,* among others.

In general, the news stories emphasized the point made by Association spokesmen that advertising claims of the nation's major toothpaste manufacturers were "misleading and detrimental to the public's dental health." Some of the headlines on the stories as they were published throughout the nation follow:

"Wants Laws With a Bite—Toothpaste Ads Pasted," "Toothpaste Claims Said Misleading, Exaggerated," "Dentists Rap Claims for Toothpastes," "It's Brushing, Not the Goo, Say Dental Men," "Misleading Ads on Toothpaste Due for Probe," "Dentists Urge Toothpaste Ad Claims Curb," "Brushing Teeth Is Main Thing, Dental Experts Say," "Dentists Ask Law Putting Burden of Proof on Toothpaste Advertisers," "Dentists Put Squeeze On Toothpaste Ads," "Chewing Over Toothpaste Ads," "Dentist Debunks Dentifrices, 'It's Brushing That Counts' ", "Dentists Urge 'Teeth' For Laws—'Reckless Claims' In Ads Charged," "Dental Group Bares Teeth at Paste Ads," "Dentists Gnash Real Teeth, Give Tooth Paste The Brush," "Toothpaste Ads Lie, Dental Men Advise Congress," "Dentifrice Makers Accused of Endangering Public Health," "Toothpaste Claims Are Under Fire," "Dental Group Calls Brands Unimportant—Says Brushing Gives Actual Benefits to Teeth, Not Paste," "Toothpaste Firms Accused of Fakery," and many more with similar themes.

Many newspapers commented editorially on the hearing. Excerpts from some of the editorials follow:

New York *World-Telegram & Sun,* Washington, D. C., *News* and other Scripps-Howard newspapers: "We agree with the American Dental Association that the Federal Trade Commission should have power to eliminate 'reckless

claims' from statements by toothpaste manufacturers. No one should be permitted to lie about his merchandise."

Detroit *Free Press:* "We have no idea who has the straight dope on this matter of brushing teeth. Certainly there are millions of people who'd like to know. We hope that both the dentists' association and the toothpaste manufacturers, each group carrying a very definite responsibility to the public, will fight it out to the point of finally concurring on what it is."

Marion, Ia., *Sentinel:* "We hope the American Dental Association gets somewhere in its request to a congressional subcommittee to do something about the misleading toothpaste advertising. The A.D.A. points out that some toothpaste manufacturers say that a brushing in the morning will overcome anything one may eat during the day. It also says that people will be told that one brushing will give them protection all day against bad breath, which may be due to some other sources. When the American Dental Association criticizes the advertising, it certainly means that something is radically wrong."

Birmingham, Ala., *Post-Herald:* "Some of the claims, particularly those dramatized on TV, are such a burlesque on common sense that it's hard to imagine very many taking them seriously. Some of them are so funny that they provide welcome comedy relief from all the slaughter in Summertime re-run westerns."

Madison, Wis., *Capital Times:* "After listening to witnesses from the Federal Trade Commission and dental experts, Chairman John Blatnik of the House subcommittee investigating toothpaste and cigarette advertising blurted out that the American people are being flooded with 'bunk and junk.' . . . Dental experts testified that much of the advertising for toothpaste is misleading and exaggerated and charge Congress with the responsibility for stopping it."

Youngstown, O., *Vindicator:* "There are no short-cuts to dental health, no matter what kind of toothpaste you use, the American Dental Association warns. . . . This doesn't mean, of course, that people should quit buying toothpaste. On the contrary it's quite useful. Generally, toothpastes leave a nice, clean taste and are refreshing to the mouth. However, they can't be depended on to prevent, or cure, diseases of the mouth. This is a job for medical men."

Chicago, *Advertising Age:* "We don't hold with the American Dental Association's notion that, with regard to toothpaste advertising, the firmly entrenched notion that everyone is innocent until proven guilty should be abandoned. But we can't help thinking that the Blatnik subcommittee may do some good in bringing a little more restraint into the advertising picture in certain areas. . . . Every decent and responsible product manufacturer, and every decent advertiser, automatically resists further regulation, but also knows that if the regulation is sound and practical, it will help rather than hurt him in the long run."

St. Louis, *Post-Dispatch:* "While motivational research seeks to exploit the irrationalities of consumer buying, it is plainly to the interest of consumers to make their buying more rational wherever they can. No doubt a great many consumers would continue to buy toothpaste and apply it just before breakfast daily even if they knew that all they wanted was a taste sensation and that they would be rendered no more healthy, beautiful or socially acceptable thereby. But at the very least they deserve protection from having their fears played on and from having false hopes aroused, as the Dental Association spokesmen suggest in their attack on reckless claims."

Pine Bluff, Ark., *Commercial:* "Our only reaction to the present stand of the Dental Association is to wonder why they were so long in coming out with their pronouncements."

Waltham, Mass., *News-Tribune:* "Many a woman who sees toothpaste as a simple necessity—and wouldn't think of paying $10 a tube for it—will scrimp every nickel and dime she can to amass $10 to $15 for a face cream of magic ingredient advertised as the key to perpetual youth. Representative Blatnik says his committee will turn its searchlight on cosmetics advertising in due course. If he is not dismayed by the great lobbying power of a conscienceless section of the cosmetics industry, and chooses to try for some legal curbs on its claims, he may someday be regarded as one of the heroes of America."

Drug Trade News: "The rather vociferous attack upon the advertising of toothpastes and dentifrices by the American Dental Association, going so far as to demand that Congress do something to control and correct it, strikes us as more noisy than convincing. We make no attempt to evaluate the scientific worth of the decay inhibiting properties of these dental hygiene products. But, we doubt that the A.D.A. assertion that there is no scientific basis for the claims made for these products will stand up. . . . The manufacturers have rendered a real public service by educating, cajoling and stimulating people to the use of tooth pastes, dentifrices and tooth brushes, and have thus made them more acutely aware of the need to cultivate good dental habits. We doubt that the A.D.A. contribution to the public health is nearly as good as that of those whom it now so loudly condemns."

COUNCIL ON DENTAL RESEARCH

Changes in American Dental Association Specifications Numbers 7 and 14

The following is a notice of change in American Dental Association Specification No. 7 for Dental Wrought Gold Wire Alloy. The first sentence of paragraph 4.1 Sampling should read, "Fifteen straight lengths, twelve inches long and 0.040 inch in diameter shall be procured at retail by a member of the American Dental Association."

The following is a notice of change in American Dental Association Specification No. 14 for Dental Chromium-Cobalt Casting Alloy. The first sentence of paragraph 4.1 Sampling should read, "The manufacturer shall provide a set of six specimens of the type described in 4.4.1."

These changes are effective immediately.

BUREAU OF PUBLIC INFORMATION
COUNCIL ON DENTAL THERAPEUTICS
COUNCIL ON LEGISLATION

American Dental Association statement on dentifrice advertising claims

Following is the statement of Sholom Pearlman, assistant secretary of the Council on Dental Therapeutics, before the Subcommittee on Legal and Monetary Affairs of the Committee on Government Operations of the House of Representatives at a hearing in Washington, D. C., on July 17. Dr. Pearlman was one of several witnesses who testified on behalf of the American Dental Association in regard to misleading and false claims made in advertising for dentifrices. This is the second of three parts.

I should like to begin this part of the testimony by presenting a brief summary of the two major dental diseases with which we are mainly concerned: dental caries and periodontal disease.

Dental caries afflicts some 95 per cent of the population and is the primary single cause of tooth loss before the age of 35. Out of a hundred years of research on the cause of tooth decay we have not yet found a complete explanation, but a concept of the disease has emerged with sufficient reproducible corroborative evidence to merit its acceptance as a sound working theory.

CAUSES OF TOOTH DECAY

1. The Role of Bacteria • It is now generally believed that dental cavities form as a result of the operation of several factors. Soon after a tooth erupts through the gums it becomes covered by a film called the dental plaque. The plaque consists of a feltlike mass of bacteria, food residues and cellular material which has been shed by the oral soft tissues, all embedded in a filamentous meshwork which adheres firmly to the enamel surface. The plaque is continually changing as bacteria die and are replaced, and as parts of it are dislodged by chewing and brushing. It is heaviest in the pits and fissures of the biting surfaces and in the relatively inaccessible places between the teeth, and it is these areas in which cavities most frequently begin to develop. The plaque, then, is a highly active and luxuriant mass of living organisms capable of performing all the chemical reactions that such organisms usually perform. The mouth provides moisture and warmth, and food, vitamins and all sorts of nutrients to perpetuate the plaque under almost ideal conditions.

2. Sugar and Acid-Formation • Many of the plaque bacteria are of the class of organisms that ferment carbohydrate substances and form acid from them as an end-product. The industrial manufacture of lactic acid and other acids depends on exactly the same process, utilizing the chemical factories within the bacteria to ferment sugar and starchy starting-materials under controlled conditions. In the dental plaque, as in the test tube and the industrial fermentation vats, sugars such as sucrose and glucose are fermented very rapidly, so that following a rinse with a 10 per cent sugar solution acid formation may begin to be observed within a minute or two, and it persists for as long as 30 minutes depending on individual conditions. Acidity is usually measured in terms of pH units, and, without going into this term in detail, it will suffice for this discussion to remember that the more concentrated the acid, the lower will be the pH value. Water is at pH 7.0 (neutral), vinegar is at about pH 3.5, and the strong acid in a car battery is at less than pH 1.0.

The enamel of the tooth is largely mineral, and consists primarily of a form of crystalline calcium phosphate called hydroxyapatite, with lesser amounts of calcium carbonate and other substances. The mineral part of the enamel is bound together in a matrix of organic material, much as the tiles in your bathroom floor are held in a matrix of cement. The hexagons of enamel, however, extend in columns or rods clear through to the underlying dentin of the tooth.

Now, when sugar reaches the plaque, as it does in quantity after a sweet dessert, for example, the bacteria immediately begin to turn it into acid. The pH of the plaque drops from the usual level of about 6.5 or 7.0 to as low as pH 4.0 in some people. The acid that is formed attacks the mineral salts of the enamel and a small quantity is dissolved away. When this process is repeated again and again, a cavity begins to form. Certain protein-destroying bacteria in the plaque may play a contributory role in dissolving the organic cement-substance, but, on the basis of overwhelming scientific evidence, acid formation appears to be the primary factor in the decay process.

After the hard and relatively insoluble enamel has been penetrated, the dentin, which is less highly mineralized and is more like ivory or bone, is destroyed rapidly. Eventually, the pulp is reached and the tooth dies.

This essentially is the story of how cavities form in our teeth.

THEORIES OF DECAY PREVENTION

1. Reduction of Dietary Carboyhydrate; Brushing After Meals • It is clear, theoretically, that we should be able to interrupt the decay process in several ways. We can first starve the system by restricting our intake of carbohydrates. This treatment has been very successful and is practiced by many caries control clinics in this country. When all fermentable sweets are eliminated and the total carbohydrate intake is restricted to about 50 calories per day, dental caries can be arrested. (Starchy foods, like potatoes, rice or bread, are not so readily converted to acid as are sugars.) This logical and clinically proved procedure is the basis for the time-long dental practice of urging the public to cut down on sweets.

Sugar sources for acid-formation may also be removed by prompt brushing of the teeth as soon as possible after eating. Dentistry has long advocated this hygienic measure, also. As has been pointed out in previous testimony, the brushing is what counts, and the tooth paste or powder is useful only as an aid to the toothbrush in cleansing the oral structures.

2. Removing the Acid-Forming Bacteria • The chain of events might be broken in a second way, by attacking the bacteria in the plaque. Unfortunately, no safe agent is now available that will kill bacteria and sterilize the mouth without damaging the tissues, and such a mechanism has not yet been applied successfully. Some experimental work with penicillin, and more recently with the antibiotic tyrothricin, in a dentifrice may provide promising leads to future success along this line.

It will be well to point out here that, unlike diseases such as malaria or influenza or tuberculosis, no single kind of bacteria has been shown to be the direct cause of dental decay. We know that lactobacilli, bacteria of the same family as those which turn milk sour, are found in large numbers in the saliva and plaques of people in whose mouths the decay process is most active. We know also that the lactobacillus count goes down when caries activity subsides. But we cannot transmit decay from one person to another by inoculating lactobacilli from one mouth to another. There are far and away more acid-producing streptococci than lactobacilli in the plaque and in saliva, and acid is formed more rapidly by some of these streptococci than by lactobacilli. It may be that once a cavity begins to form, it provides an ideal nesting-place for lactobacilli, and they begin to thrive more abundantly in the mouth when they are sheltered in these cavities and spaces; in that situation they would undoubtedly contribute to cavity formation by fermenting sugar, along with the other acid-forming bacteria. Nevertheless, because lactobacilli are relatively easy to isolate from saliva and to identify on a bacteriological growth plate, the lactobacillus count has come to be used pretty widely as a convenient and fairly reliable indicator of caries progress. When a caries-active patient is placed on a low-sugar diet, for example, to control the progress of the disease, he is held to that diet until the lactobacillus count reaches a certain low level, and then starches and some sweets are gradually introduced in moderation into his diet.

3. The "Anti-Enzyme" Theory • The process of cavity formation is theoretically vulnerable at a third point: interference with the enzymes that carry out the chemical reactions by which sugar is converted to acid within the bacterial cells. This has been the objective of the so-called "anti-enzyme" dentifrices. More than a dozen enzymes operate in a sort of chain or "bucket brigade" to pass the sugar molecule through a series of well-defined chemical conversions down to lactic and other acids. If this chain is disrupted at any stage, acid-production will stop.

Enzymes are large protein molecules and they can be inactivated in a number of ways. Many foaming agents and synthetic detergents can inactivate enzymes in the test tube, and either stop the fermentation process, or stop a more vital enzymatic process in the cell which

MAGICAL NEW FLUORIDE TOOTH PASTE

Saves Your Teeth from Decay

BY PREVENTING CAVITIES FROM FORMING!

Test after test by Dentists proved it!
FIRST and ONLY Tooth Paste containing All 3 of the best decay-fighters known!
1. FLUORIDE 2. AMMONIATED 3. ANTI-ENZYME "ALS"
Super Amm-i-dent
Amm-i-dent
The brand new paste... with the grand new taste ...in the new red carton!

"SUPER" AMM-I-DENT with FLUORIDE

Figure 1

may result in the death of the organism. The "sulfa" drugs appear to act specifically, in a manner which is similar to the latter mechanism. Iodine and other antiseptics and germicides act more generally on a variety of protein enzymes.

4. Neutralization of Bacterial Acids • There is a fourth possible method of breaking the chain of events that lead to decay: neutralize the acid before it attacks the enamel. So far, attempts to prevent decay with alkaline or ammonia-liberating dentifrices have not met with great success.

5. Fortifying the Decay-Resistance of the Teeth • The fifth and last theoretical approach which we need to discuss before we consider dentifrice claims is the fortification of the tooth substance against the dissolving effects of the acid. The mechanism by which fluoridated water exerts its beneficial effects has not been clearly elucidated, but it appears that decreased enamel solubility may be an important factor. It appears that if sufficient fluoride is incorporated into the tooth minerals while the teeth are developing, the enamel of those teeth is less soluble and more resistant to acid attack. This may also be the reason for the modest reduction in dental caries that frequently follows the application of sodium fluoride solutions to children's teeth by the dentist. As we shall see, this idea forms the basis for some of the claims that are made for fluoride-containing tooth pastes.

This, then, is a capsule summary of what we know of the decay process and some of its vulnerable points.

PRACTICAL VERSUS THEORETICAL CONSIDERATIONS

It must be emphasized that rational treatment or prevention of a disease cannot depend on mere theoretical considerations alone. Just as the proof of the pudding is in the eating, the test of a caries-preventing agent is its actual effectiveness in reducing or preventing decay in human beings, not experimentally, but under the conditions in which it will be used by the patient. The Council on Dental Therapeutics, which for nearly 30 years has been evaluating drugs for the dental profession, demands this kind of proof for every item which comes to its attention for consideration. Although some dentifrice research may appear to indicate promising lines of progress for the future, it is the Council's stated opinion that no dentifrice available today has been demonstrated to be of significant value in preventing oral disease. In most cases where some suggestive evidence has been produced, the Council has found that the advertising claims exaggerate, inflate and otherwise distort the limited scientific findings to the point where the unsophisticated consumer, and even the dentist with his wider knowledge of the subject, is grossly misled and flatly deceived. Let us now turn to some of the more striking examples of this exaggeration, distortion and deceit.

DENTIFRICE ADVERTISING

1. Super Amm-i-dent with Fluoride • An ad for Super Amm-i-dent with Fluoride is shown in Figure 1. It first appeared in the autumn of 1955, when the fluoride tooth paste boom was building toward its peak. Let us pass over, for the moment, the obvious "puffery" of the top slogan in which it is claimed to be a "magical" tooth paste. I should like you to look at this statement: "Saves Your Teeth From Decay." To me, and to anyone who sees this advertisement, this states with absolute certainty and conviction that I will have no more cavities whatsoever

if I use this tooth paste. In the next line it says that it does this remarkable thing "by preventing cavities from forming." I think tee of 100 per cent protection against decay, there can be no doubt that these statements create the impression of an absolute guaranfor everybody.

We had not seen any reports in the scientific literature to support this claim, but it is understandable that, with competition so keen in the tooth paste field, the manufacturer may have released the product and the ad on the basis of unpublished data in his files. When the product first appeared, in July 1955, we wrote to the Block Drug Company and asked for supporting evidence. In reply, the firm wrote that the active ingredients were: urea 13 per cent, sodium N-lauroyl sarcosinate 1.7 per cent, and sodium fluoride 0.1 per cent. We were told also that clinical studies were not yet complete but that laboratory screening tests had shown, among other things, that the addition of fluoride to the original Amm-i-dent formula did not interfere with the action of the ammonia-liberating compound urea, already present in the dentifrice.

The Council had already evaluated the old Amm-i-dent and had classified it in Group C, which means that the Council considered the available evidence to be inconclusive and inadequate to permit a sound scientific evaluation. Now the firm was telling us that the new product, with fluoride, was not any worse than the original.

To this day we have seen not a single report of a clinical study of Super Amm-i-dent with Fluoride, either good, bad or indifferent. As far as we know, the clinical program mentioned in the firm's letter three years ago has still not been completed, and we don't know where or how it is being conducted. Yet, in October 1955, this ad proclaimed that "Test after test by Dentists proved it!" We know of not one single dentist who has even tried to prove that Super Amm-i-dent with Fluoride "Saves Your Teeth From Decay."

The lesser statements, which appear in small type, make other unsupported claims. We know that water fluoridation will help to prevent decay in the general population and there are years of study and a vast amount of irrefutable evidence, compiled by impartial investigators, which establish its limited but worthwhile effectiveness and its safety. This ad says that the "magic of fluoride" (and there is nothing magic about it), as demonstrated in water fluoridation studies, has now been captured in this tooth paste "so every family, everywhere, can save teeth from decay this amazing new way!" No proof has ever been offered for this claim. Fluoridated water, as was pointed out, appears to build decay-resistance into the teeth if it is consumed while the teeth are still forming within the child's jaws. Once they have formed, the resistance-building effect of water-borne fluoride can no longer operate in the same way. And no one yet has shown that by brushing with this dentifrice, containing 0.1 per cent sodium fluoride, tooth resistance can be built up and decay can be eliminated. Nevertheless, this ad declares, in the second column, that "New 'Super' Amm-i-dent with fluoride works its magic all day long by strengthening permanent teeth—inside and out. It makes tooth enamel so much stronger, more resistant to decay, that cavities couldn't even get started in case after case tested!"

If the facts were available, you would think the manufacturer would hasten to let us know. We have not heard from the firm on these matters since 1955, and we have not been able to find a report of a single one of the cases referred to.

There are many other points that we could discuss before leaving this ad, but I would like to take time only for one, which appears to be a deliberate attempt at deception. Examine the right hand picture. The caption says "TESTS PROVE 'SUPER' AMM-I-DENT WITH FLUORIDE SAVES TEETH! Left tooth, unprotected from mouth acids . . . *eaten away*. Right tooth, protected by 'Super' Amm-i-dent . . . *no decay!*"

Most of you may remember seeing a television demonstration of this test. Any high-school chemistry student could spot the fallacy here. In the container above the left tooth there is supposed to be acid. After it drips on the tooth for a time, the crown is dissolved away. This experiment can be demonstrated in the laboratory with ease. It is a simple decalcification process, but is not decay. In the experiment on the right, however, the solution is cloudy because tooth paste has been added to "protect the tooth." Now tooth pastes contain abrasives that are either phosphates, carbonates or other insoluble salts of calcium magnesium and other elements. All of these salts have one thing in common that is important to this discussion, that is: they will neutralize acid. In the right-hand picture, then, we see a drop falling on the tooth. It is extremely unlikely that this drop would contain enough free acid to dissolve a material as soluble as ordinary chalk, let alone dental enamel. With a few calculations and simple chemical dilutions anyone could set up an experiment like this as an amusing trick. In advertising, however, it has little entertainment value.

In the analysis of this advertisement, I have

Figure 2

touched only on some of the highlights. I think you may agree that this is a clear example of false, misleading and deceptive advertising.

Before we go on, I should like you simply to note that this product also contains "Anti-enzyme 'SLS'," sodium lauroyl sarcosinate. We will hear more about this "antienzyme" factor in a little while.

II. Brisk Fluoride Toothpaste • Here is another sodium fluoride tooth paste, a product of the Colgate-Palmolive Company. In this ad (Fig. 2) we can see many of the same sort of claims that were in the preceding one. Here we have fluoride ". . . in its most effective form." We get the clear impression that dentists use this product in preventing decay because "ONLY BRISK TOOTHPASTE gives you the same fluoride dentists use"; and "of the many fluorides, *only* Brisk's fluoride is so widely used and approved by medical, dental and public health authorities!" Notice how carefully the ad avoids saying outright that dentists use Brisk Toothpaste or that health authorities approve Brisk Toothpaste. If these statements were made they would be absolutely false, of course. But it seems that the advertisers have no scruples about making statements that are only deceptive and clearly misleading. How many potential customers do you think will read the "fine print" and will be aware of the subtle distinctions that must be made?

Brisk is claimed to contain "The same tooth decay fighter proved for 10 years in drinking water!" Water fluoridation has been studied for longer than ten years, but no ten-year study or five-year study or even a one-year study has been reported which might indicate that Brisk Toothpaste will prevent decay—at least, we have not been able to find any reports of this nature.

We may note in passing, such claims as "concentrates in weak or 'soft' spots where decay usually starts," and "Daily brushing with Brisk builds stronger, sounder, more decay-free teeth." Some extensive comments have been prepared in written form on these and other misconstructions of fact and we would like to submit them to you for the record where they may be studied at leisure. The important thing is that in this advertisement there is a clear attempt to capitalize on the impressive and sound scientific findings that form the basis of water fluoridation and to deceive and mislead the reader into accepting this tooth paste preparation as a convenient and an even better substitute for that public health measure. We believe that the false sense of security which this kind of advertising engenders constitutes, on the contrary, a significant public health menace.

III. Crest Toothpaste with Fluoristan • The most broadly advertised fluoride dentifrice is Crest Toothpaste with Fluoristan, which is manufactured by the Procter and Gamble Company. This product is promoted extensively in television and radio media and in print ads in almost all the important publications on a nationwide basis. This advertisement (Fig. 3) is one of a series which is currently being used. The pattern in these ads is the same but the textual material in finer print on the left side changes, as does the artwork.

The theme of these ads is "Look, Mom — no cavities!" This appears in bold face type here, and is also featured with clear emphasis in the television commercials. This ad conveys the message that because this child used Crest his dentist could not find a single new cavity at the examination from which the youngster has just returned. It carries the clear implication that everyone who uses Crest can have the same thing happen to him and that if your dentist has found cavities at your last examination you should use Crest and eliminate the problem completely. "No cavities" means nothing but 100 per cent freedom from decay.

If the reader of the ad reads the smaller

print below this slogan, he may find that some qualification of the claim is presented toward the end of the section, where it is explained that what goes before "means far less decay for grownups and children." In parts of the fine print on the left side the ad also refers to "*far less new decay.*" Nevertheless, the strongest impact of this ad is in the slogan "Look, Mom — no cavities!", and this, with the inferences to which it is inseparably bound, constitutes at best both a gross exaggeration and a misleading distortion.

Crest Toothpaste is different from other fluoride tooth pastes in two important respects. First, the fluoride used in this product, covered by the trade mark "Fluoristan," is stannous fluoride, that is, tin fluoride; the others contain sodium fluoride, a different chemical compound. Secondly, and this reflects to the credit of at least one division of the Procter & Gamble Company, a substantial amount of research has been supported in an effort to develop an effective dentifrice based on stannous fluoride as a caries-preventing ingredient. Out of this research has come the product which is now marketed as Crest.

Representatives of the American Dental Association conferred over a year ago with representatives of the company and with some of the research investigators who have done work in independent universities on some aspects of the development of this tooth paste. We reviewed the chemical and other laboratory studies that first demonstrated the possible usefulness of stannous fluoride as a decay-preventive. We reviewed evidence which shows that application of a fresh stannous fluoride solution to the teeth of children by the dentist, under special conditions, apparently results in a lower decay rate on the average. We reviewed laboratory studies which showed that fluoride was taken up by the enamel of teeth immersed in a slurry of a dentifrice containing stannous fluoride, and that the enamel so treated appeared to acquire some resistance to the action of acids, although the persistence of this effect over a substantial period of time was not demonstrated. We went over the preliminary clinical studies of the use of a stannous fluoride dentifrice in children and young adults over periods of one or two years, which indicated that some

Figure 3

reduction in new cavity formation might be expected from the use of the experimental tooth paste.

At the same time we learned that in almost all of these studies with the early forms of Crest Toothpaste, the beneficial effects observed in the first year of use were not nearly so striking the second year. In some cases there appeared to be no significant effect even in the first year. The company realized that stannous fluoride was a very unstable compound when used in a tooth paste, and these failures led them to change the formula from time to time in order to overcome the problem of loss of activity during storage of the product and other equally disturbing changes. The culmination of developments up to the time of that conference was the formulation of the product which was sold at that time as Crest. This Crest Toothpaste was not of the same formula as the original Crest, and we do not know whether the product sold today is identical with the one discussed in 1956, or if it has undergone other changes in composition since that time.

The importance of this whole point is that whenever you make the slightest change in the formulation of a product you always have to be sure that that change has not interfered with the activity of the product. In the field of drugs, and in evaluating therapeutic agents, there are many good examples of cases where a desirable therapeutic effect was lost because of a change in the product which might appear to be totally insignificant on a theoretical basis. Even the material from which the container is made may have a destructive effect on the ingredients. With respect to dentifrices, we know that certain abrasives are incompatible with other ingredients and will often inactivate their special effects. This is the sort of problem Procter and Gamble ran into, we were told, in stabilizing the stannous fluoride, and the trade mark "Fluoristan" covers not just the tin fluoride but also some of the chemicals with which it is compounded.

When all of this information became known to us, we asked which of the clinical studies sponsored by the company had been done with the tooth paste that was actually being sold to the public. We were told that only in one study was a paste identical with Crest being tested. That study was then still in progress in a Minnesota community. It has now been terminated at the end of two years.

The evidence in support of the claims for Crest Toothpaste, then, relates to only one completed study. In that study, at the end of the first year the investigators reported that the 248 children who used the Crest formula, containing 0.4 per cent stannous fluoride, had about 35 per cent less decay on the average than did the 257 children who used a tooth paste which was identical except that it contained 1 per cent stannous pyrophosphate instead of stannous fluoride. Thirty-eight per cent of the Crest group had no new cavities the first year, which means that 62 per cent of them did. In the control group, 20 per cent of the children developed no new cavities, without using fluoride tooth paste.

The results of the two-year examination have not yet been published, but the authors, both dentists, have very kindly permitted us to refer to their data. The results as tabulated show a reduction over the whole two-year period of less than 16 per cent when brushing was unsupervised, and no more than 21 per cent when brushing was done in school under some measure of supervision.

The results for the second year alone can only be estimated roughly from these figures, but on the basis of a 35 per cent reduction the first year, the figures for two years would suggest that there was only at best about 7 per cent reduction in the second year alone, and at worst no reduction at all. These figures are, of course, only estimates, but they clearly indicate that the stannous fluoride tooth paste had practically no effect in the second year of its use. We cannot yet tell, from these data, how many children during the second year of the study were able to come home calling, "Look, Mom — no cavities!"

This, then, is the background for the current claims for Crest, and for the "Triumph over Decay!" theme which announced the premature launching of a distant ancestor of Crest Toothpaste on the market a few years ago. We feel that these ads are unquestionably misleading and deceptive. By exaggerating and distorting the modest findings of the scientific investigators, these advertisements nullify the very purpose of the investigations. Moreover, they clearly illustrate that the firm has sacrificed scientific integrity for the sake of commercial expediency.

IV. Gleem • Another tooth paste, made by the same firm, is Gleem with GL-70. The advertisements (Fig. 4) for this product emphasize two main themes: first, that the product is unique in that you only have to brush your teeth once a day if you use Gleem and second, that this is so because just one brushing with Gleem destroys 90 per cent of the "decay- and odor-causing bacteria" that live in the mouth. The effect of the advertising is to create the distinct impression that if one uses Gleem first thing in the morning the mouth will be practically free of bacteria all day long and one will therefore be protected se-

curely against decay and mouth odor all day.

The advertisements recognize that it is best to brush after every meal, as indicated in the statement at the top left of this particular ad. but the rest of the ad is carefully calculated to discourage this sensible and often essential oral hygiene practice.

People in this country are not yet used to the idea of carrying a toothbrush with them all day, even though most men carry pocket-combs, nail-files, and cigarette lighters, and most ladies consider it essential in addition to carry lipsticks, cosmetic cases and other accessories in their handbags. The application of new make-up after a meal is now so routine that no one is offended when a woman goes through a complete make-up routine even in public places. The people who do sensibly use a toothbrush after eating usually do so in the relative privacy of the washroom.

The point is that food residues should be removed from the teeth as quickly as possible after eating. This procedure removes much of the substrate material from which bacteria may otherwise produce acids and enhance the decay process, and from which other bacteria may produce foul-smelling decomposition products and even some irritating substances that may contribute to the development of gingivitis and periodontal disease.

We have clinical evidence to show that decay can be reduced more effectively by brushing after every meal than by brushing only once or twice a day. Moreover, and here the American Academy of Periodontology is very deeply concerned, the accumulations of food at the necks of the teeth along the margins of the gums must be removed as quickly as possible in order to maintain conditions that are best for preventing gum disease and its often disastrous sequelae.

The development of periodontal disease, or "pyorrhea" as it is still called by many people, can be illustrated very briefly.

The gingivae are the normally pink and firm tissues that cover the submerged portion of the tooth and its bony understructure; the whole structure covered by the gingivae is generally called the gums. For reasons that are still not clear, a number of exciting factors may cause inflammation of this tissue, chiefly at the gingival margin next to the exposed part of the tooth. The inflammation is usually noticed in the form of color change from pink to red, as a result of engorgement of the tissue with blood. The name given to this condition is gingivitis. The inflamed gingival tissue bleeds easily and a common indication of the presence of the disease is "pink tooth brush," a sign that appears even in the early stages.

Figure 4

Gingivitis can occur as a result of poor oral hygiene, accumulation of food deposits at the necks of the teeth, "traumatogenic occlusion" (when certain teeth receive more than their share of stress and shock during the biting and chewing movements), or spontaneously during pregnancy, or for no apparent reason. Bacteria unquestionably are present in the furrow between the tooth and the encircling gingival cuff, and their destruction by means of chemicals or drugs sometimes affords temporary relief. But in the normal course of events, calculus (tartar) is formed in the gingival crevice (perhaps through the indirect activity of some bacteria). These deposits cause the gingivae to recede rootward in a sort of "foreign body reaction," which is usually accompanied by further inflammatory changes. This is the beginning of serious periodontal disease. As the disease proceeds, secondary infection and exudation of pus ensues. The supporting jawbone is progressively reduced in size until eventually the tooth loses its bony support and is either exfoliated or is extracted when the condition becomes hopeless. The bone and the overlying tissues may then regenerate to some extent, but seldom is the alveolar ridge restored to its original height and condition. This makes the retention of artificial dentures a difficult and sometimes impossible task.

The dentist and the periodontal specialist

can arrest the progress of gingivitis and periodontitis by removing some of the causative factors, that is, by eliminating traumatogenic "high spots" on the teeth, correcting the patient's "bite," carefully removing calculus deposits from above and below the gum-line, or by surgical elimination of the periodontal pockets. But to maintain a clean and hygienic state of gingival health and to prevent recurrence of the disease, the patient must follow a rigid and regular regimen of toothbrushing and mouth care. The food debris must not be allowed to accumulate in the critical areas, and the dentist usually instructs the patient to clean his teeth at least three times a day after meals and sometimes even more often.

Periodontists for years have devoted a great deal of time and patient instructional efforts toward educating patients in the proper use of the toothbrush and in the necessity of brushing the teeth at least after each meal. All this educational work is being broken down by those tooth paste ads which say, in effect, "Never mind what your dentist says is best for you. With our tooth paste you only need to brush your teeth once a day." This kind of advertising is not only misleading and deceptive, but it is harmful to the public because it encourages inadequate health habits and discourages adherence to sound professional advice. If this trend in advertising is followed by other dentifrice manufacturers, as has so often been the case with other sales themes in the past, the situation will become one of even more serious concern. Some of the recent ads for Colgate Dental Cream indicate that this manufacturer already has fallen into line. We have seen television commercials which include a statement to the effect that just one brushing with Colgate's provides protection. The dental profession already is hard put to cope with these problems by educational means, and it will be virtually impossible to counteract the effects of more extensive propagation of such detrimental advertising with the limited means available to the profession.

If this point requires further elaboration, we have a recent example of its importance. A series of posters has been developed by the Bureau of Dental Health Education of the American Dental Association. These posters are intended to provide pictorial ideas without words, for use in kindergarten classes and the lower grades as a basis for discussion at the elementary level. The children are asked to say what story the poster tells. To get an idea of how they will be received by teachers and by the children, a set of the posters was distributed to several teachers in the Chicago area for trial. One of them shows a child washing his hands before his meal and brushing his teeth afterwards.

When this poster was presented for discussion, the children quickly understood and agreed that it is a good health practice to wash hands before you eat. But when they considered the last picture there was a great argument about the need for brushing the teeth after eating. They said that certain television characters, in whom they evidently placed a great deal of confidence, always said that you only have to brush once in the morning because the tooth paste had something in it that would protect your teeth all day.

These are the ideas implanted by this kind of advertising in the minds of little children, who are least able to evaluate the statements, and who are at the age when the groundwork is being laid for the formation of lifelong habits.

The claims for Gleem in the area of tooth decay also are misleading and deceptive. The ingredients of GL-70 have not been disclosed, but information received in 1953 indicates that at that time GL-70 was a mixture of sodium mono-glyceride sulfonate and sodium alkyl sulfate, two kinds of "synthetic detergents." The tooth paste was stated to contain 1 per cent of this mixture. We have no information on the present product, and in view of the history of other dentifrices, some changes in composition probably have been made over the past five years. The data offered in support of the decay claims, however, were based at least in part on tests performed during or prior to 1953.

The claims in this fairly recent advertisement, which are repeated with slight variations in television commercials and elsewhere, indicated that one brushing with Gleem destroys 90 per cent of the oral bacteria. The statement carefully states ". . . . up to 90%" but it will be seen that the figure "90%" is in type about twice as large as that used for the words "up to," and the inference will be quite clear to all but the meticulous reader. The pictures representing the bacterial count leave no doubt about what idea the ad hopes to convey: one brushing with Gleem kills almost 100 per cent of decay- and odor-causing bacteria. The reader is freely invited to take the bait and draw the obvious inference: that one daily brushing with Gleem stops nearly 100 per cent of tooth decay and mouth odor. This suggestion is reinforced in several places through the ad by such phrases as "completely destroys most bacteria," "strikes right at the very cause of decay and mouth odor," "Mouth odor stopped all day" and so forth. The message is unmistakable.

The bacterial tests behind the decay-pre-

vention claims are reported to have been performed in the following way. Before breakfast, subjects brushed their teeth for one minute with salt water, all the fluid was collected, and bacterial counting plates were made from a measured part of it. Ten minutes later they brushed with about a half inch of Gleem tooth paste, and the mouth contents were discarded. After another 10 minutes they brushed again with the saline solution and the mouth contents were collected for bacteriological plating. The "before" and "after" plate counts were compared and the difference in count was expressed as "per cent reduction." The tests were repeated on successive days so that averages for each subject could be calculated.

Now I am sure you will recognize several fallacies in this procedure. In the first place the test may give an estimate of the numbers of bacteria that were removed in brushing, but it does not tell how many bacteria were destroyed in the dental plaque on the susceptible surfaces of the teeth where the decay process goes on. The fluid that was tested represents only a part of the millions of bacteria in the mouth, and includes those that were dislodged from the tongue, cheeks and soft tissues as well.

Secondly, the "after" count represents the bacteria that could be dislodged on the third brushing within a 20-minute period, of which the second treatment was with a foaming, abrasive dentifrice. The tests did not employ even a minimum control for comparison, which might have been arranged simply by substituting salt solution again for the tooth paste during the second brushing step, in a number of subjects. There is no adequate answer to the obvious question: What reductions in bacterial count would you get without the tooth paste?

A third fallacy involves the antibacterial or germicidal attributes of the tooth paste. It is well known that in testing the effects of germicides care must be taken to avoid carrying small amounts of the chemical over into the bacteriological culture tubes or plates. We have examined a statement in which it is claimed that GL-70 "has definite anti-bacterial properties" even when diluted to less than 1 part in 1,000,000 (10 per cent x 1 per cent x 1:10,000). It follows that in the fluid from the "after" brushing, which was collected ten minutes after the use of Gleem, the presence of as little as 1 part of GL-70 per million parts of fluid might affect the growth of the bacteria in the salt water and saliva mixture. The bacterial counts should then certainly be low, since the bacteria in the culture medium would be constantly exposed to a germicidal agent. Evidently no effort was made in these tests to neutralize any residual activity from the GL-70, or even to determine whether there was any appreciable carry-over. This is not the sound scientific approach one would expect to be followed in an objective investigation.

From the reports we have reviewed we would not agree that it has been proved that one brushing with Gleem with GL-70 really destroys 90 per cent of the bacteria that reside in the mouth. Moreover, it is evident from the bacteriological data, taking into account the inadequacies just reviewed, that in many subjects the apparent reduction of bacterial count often was less than 10 per cent, and that only 3.5 per cent of the subjects showed an average reduction of 90 per cent. The most important criticism, however, is that the method of testing was so unreliable as to make the results almost meaningless.

Even if the advertisements are interpreted literally, on the basis of the actual, carefully chosen words, the statements are not well-supported by scientific facts and are therefore misleading. If the advertising claims are interpreted more broadly to mean that Gleem in some special fashion reduces or prevents decay, or "fights decay" as the ads often say, then the effects are completely misleading because there is apparently no evidence whatsoever that a single clinical trial of this tooth paste was conducted to determine whether its use will afford any unusual degree of protection against the disease.

In summary, then, the advertising for Gleem tooth paste with GL-70 is not only misleading and deceptive, but it is extremely undesirable because it promotes the breakdown of important oral health habits and practices.

V. Ipana with WD-9 • The antibacterial effects of some of the foaming agents used in dentifrices have been exaggerated in advertising for a great many products. Ipana Tooth Paste for some years has been promoted on the basis of the alleged caries-preventive properties of its particular foaming agent, "WD-9."

In this ad (Fig. 5) we see a child who has recently lost his first upper incisor tooth. The main caption indicates that the new permanent tooth that will fill the space must last for 63 years, suggesting that special care must be taken to see that the permanent teeth will last a whole lifetime. The inference, of course, is that regular use of Ipana will give the teeth the protection they need to survive that long, and the material in the text goes on to tell why.

The discussion says that while brushing the teeth is a good practice, "It's even *better* if he

Figure 5

uses Ipana with WD-9!", because "WD-9 is a powerful decay fighter."

"WD-9" is the firm's name for sodium lauryl sulfate, a type of "synthetic detergent" that is employed in several tooth pastes as a foaming agent. It has some antibacterial activity, and there is evidence that that activity is not lost when the material is mixed with the other ingredients of the tooth paste. But, as far as we have been able to determine, there has never been a clinical trial of Ipana with WD-9 to show what effect, if any, the use of this product may have on decay in human subjects. We know of no evidence to support the claim that "WD-9 is a powerful decay fighter."

The ad also says that "Ipana with WD-9 destroys decay bacteria best of all leading brands . . ." In more recent ads, and especially in television commercials, it is claimed that Ipana has twice the decay-germ killing power of any other tooth paste. We have already pointed out that terms like "decay bacteria" are misleading because they imply that killing certain bacteria will stop decay. If Ipana is claimed to have twice the decay-germ killing power, then the advertisements may be considered to be just twice as misleading. If one brushing with Gleem destroys 90 per cent of the so-called decay bacteria, does Ipana destroy 180 per cent? Obviously this sort of advertising is confusing, and because it is confusing it will be misleading to many readers.

The bacteriological basis for the Ipana claims are discussed in supplementary material that we would like to submit for the record. The reported activity of Ipana was as much as four times greater in some tests than it was in others. With a test so unreliably standardized that a four-fold variation can occur from one day to another, the acceptability of claims for superiority over other brands must certainly be questioned.

The printed ads for Ipana are modest in comparison to some of the television commercials. The visual emphasis and the vocal presentation exaggerate the claims even further. The "Bucky Beaver" series and other material which is directed to very young children are especially blatant in their exaggeration of the claims. The finality with which Ipana routs the character called "Decay Germ" and foils his plans to "blast holes in your teeth" is a gross distortion of the properties of the tooth paste. It implies that Ipana has a magic property which gives complete protection against decay. No such property has been demonstrated. The dramatic impact of these commercials on the children establishes false beliefs that for a long time will interfere with the teaching of sound dental health concepts.

VI. Colgate Dental Cream with Gardol • According to information obtained periodically from market surveys, the tooth paste that leads the field year after year from the standpoint of sales is Colgate Dental Cream. This product contains an ingredient called Gardol which is the fanciful name for sodium N-lauroyl sarcosinate. "Gardol" suggests that the material is there to guard all your teeth.

A discussion of the laboratory tests with this material and the clinical studies that form the basis of the extravagant claims for Gardol in protecting the teeth against decay will be presented in separate testimony. I should like to point out that the Council on Dental Therapeutics has evaluated all of the published evidence and considers it inadequate to support the claims.

These two ads (Fig. 6) are typical of the promotional material that has been employed for Colgate Dental Cream over the past few years. Under the picture of the "invisible shield" is the statement that "Gardol's invisible shield fights tooth decay all day . . . with just one brushing." This theme is fortified in several places elsewhere in the ad.

In the major report of the two-year study which is the strongest basis for the claims, there is no mention of the effectiveness of the product after only one brushing a day. The test groups brushed either twice a day or three

times a day with the Gardol tooth paste. The results of these tests, as I have just indicated, were not considered to be conclusive. To the best of our knowledge there has not been a study of the effects on tooth decay of once-a-day brushing with this product; if its use twice or three times a day produced no conclusive results, it is hardly likely that one daily brushing would be any more beneficial.

The "invisible shield" pictured here is a small replica of the giant "invisible" barrier that is shown in the television commercials. In the absence of direct evidence it would appear that the shield concept may stem from laboratory tests which, perhaps, show that small amounts of Gardol can be detected on the teeth several hours after a brushing with the tooth paste. Sodium N-lauroyl sarcosinate does have antibacterial activity but, as has been pointed out in the case of other foaming agents, the mere ability to inhibit bacterial growth is not the same thing as the ability to prevent cavities from forming. And even if traces of Gardol are found on the teeth some time after the tooth paste is used, it is certain that the original film of the material has been abraded and scraped by the foods we eat so that it is no longer intact. In effect, then, while the Gardol could perhaps be detected on parts of the tooth, the so-called "shield" might at the same time be shot full of holes.

The impression that this advertising strives to create is that one brushing with Colgate Dental Cream produces absolutely invulnerable protection all day, and assures 100 per cent immunity against tooth decay. The ads we have reproduced here do not convey the full message. One has only to watch one of the television films to get the total impact.

The films explain how Gardol works. In some of them, for example, a baseball is shown being thrown toward the camera; at a critical moment an "invisible shield" stops the ball, with appropriate sound effects, and deflects it harmlessly out of the way. The announcer explains that "just as this invisible shield helped protect us (from the flying objects)" . . . . Gardol forms "an invisible protective shield around your teeth." In other films the flying object may be a driven golf ball, or a shovelful of dirt, or a tennis ball, and so on. In a current film, after the "invisible shield" has stopped the flying missile from striking a woman and child, the woman raps her knuckles against it to illustrate to the child that the miracle shield is still there. The announcer keeps up his hard-driving message to reinforce the ideas further.

There can be no doubt in anyone's mind that these commercials are trying to tell the world that one brushing with Gardol stops decay "*cold.*" No one can miss the finality of that message. And how many can judge whether it is true or not? This line of advertising is nothing but outright deception. The "Mighty Mouse" series of television commercials, beamed at children several times a week, is even worse from the standpoint of ability to confuse, mislead and establish bad dental health concepts.

Of course, the advertisements make token gestures in the interest of staying within the technical limits. For example, they say "Colgate's with Gardol stops mouth odor all day *for most people*" (emphasis not in original). The words "for most people" are underemphasized, though they are of critical importance. Then the ad says "And of all leading toothpastes*, only Colgate's contains Gardol . . ." The asterisk refers to microscopic print in the lower left of the ad which says "*Top three brands after Colgate's." This, of course, excludes brands like Super Amm-i-dent with Fluoride, which contains sodium N-lauroyl sarcosinate as one of three wonder ingredients. Sears Roebuck's tooth paste, Walgreen's and several other less popular brands which contain the same chemical.

Figure 6

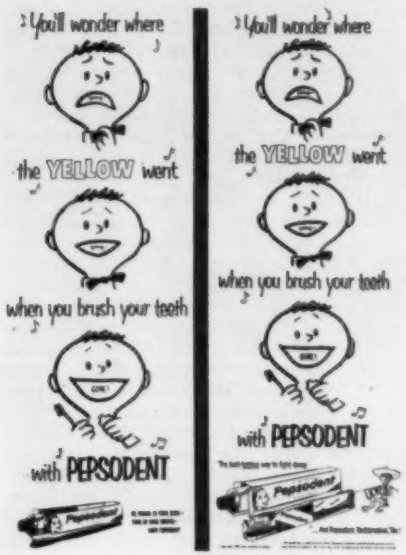

Figure 7

In the television films, these and similar qualifying statements are thrown in so inconspicuously that they are sure to be missed unless one is carefully watching for them. This audio-visual sleight-of-hand is a clear indication of deceptive intent, and the over-all effect is definitely misleading.

I might also mention, in passing, the use of the white-coated figure—a woman, in this case—holding a dentist's mirror and talking authoritatively to the patient. This clearly aims at giving the impression that dentists or dental hygienists recommend Colgate's tooth paste and that professional people as a whole support the claims. Nothing could be further from the truth.

It is somewhat shocking to realize that a firm like Colgate-Palmolive, which surely must be aware of the shortcomings of the scientific background for its product, apparently has authorized its advertising department to make deliberate efforts to conceal the facts from the consumer, in the interest of successful sales competition. This is the same firm that has set up and is supporting a Division of Dental Medicine on the campus of Rutgers University, where some excellent research in basic dental science is going on, apparently not related to tooth paste development. This is the firm that for the past few years has donated about $15,000 annually so that senior dental students across the country may receive complimentary copies of the *Journal of Dental Research*. One may wonder how, in all good conscience, the management can support pure science and philanthropy with one hand, and accept the fruits of public exploitation with the other.

VII. Pepsodent Toothpaste with Irium and IMP • This panel (Fig. 7) shows two closely related ads for Pepsodent Toothpaste with Irium and IMP. Irium is Lever Brothers' trade name for sodium lauryl sulfate, the same foaming agent that another manufacturer calls "WD-9."

"IMP" is an abbreviation of "insoluble metaphosphate," the ingredient that serves as a polishing agent. The firm has evidence from limited studies to show that Pepsodent with IMP does a better polishing job on the teeth than several dentifrices with which the product was compared. A few years ago, the advertisements claimed special effects for the Irium ingredient, but for some time this line of promotion has been subordinated and the primary emphasis has been on cleansing and on the flavor of the tooth paste.

The main slogans have been "You wonder where the yellow went" and ". . . a clean, fresh mouth." The ad on the left claims only that Pepsodent is a good cleansing dentifrice and that it removes superficial stains.

But in the ad on the right you will note the phrase "the best-*tasting* way to fight decay."

In some of the television films that were used last year, there is a jingle which contains the claim that "Irium fights tooth decay."

We have seen no evidence that supports these claims, and they are therefore considered misleading.

In all fairness, however, it should be stated for the record that the ads for Pepsodent are generally not objectionable. They are certainly the least offensive of all advertisements we have reviewed for the major dentifrices, and if it were not for the fact that decay-protection claims appear in some of the ads, they would serve as examples of good dentifrice promotion. The fact that the firm has continued to place major emphasis on cleansing and taste is an indication that other tooth pastes probably could be sold successfully without the necessity of going into insupportable claims for therapeutic or protective effects. Ads like these are refreshing exceptions to the general run of unscrupulous, extravagant distortions which we have reviewed here.

VIII. Stripe Toothpaste with Hexachlorophene • Up to now, Lever Brothers has had

only one major tooth paste in the national market, Pepsodent. Early this year we began to see ads for this one—Stripe with Hexachlorophene (Fig. 8). Hexachlorophene is a phenolic germicide that is employed widely in "germicidal" soaps, like Dial soap which contains 2 per cent of the compound, and in some baby lotions.

The tube for Stripe Toothpaste is cleverly designed so that the paste comes out white with red stripes, resembling a candy-cane. One would think that this "gimmick" alone could be relied upon to sell the toothpaste as a more attractive cleansing dentifrice. Evidently the firm did not think so. Hexachlorophene provides the basis for a whole series of antibacterial claims, which in some respects go beyond those that have already been reviewed herein.

Stripe is claimed to kill "bad breath and decay germs—*better* than any leading *tooth paste—better* than any leading *mouthwash—even better* than using *both!*"

The once-a-day brushing theme is employed in even more offensive terms than with other products: "A single brushing with Stripe will protect you against the cause of decay and mouth odors *hours* longer than any other tooth paste you can buy."

And the claim for specific, penetrating action is expressed emphatically: "Stripe's Hexachlorophene seeks out and destroys germs even in the tiny crevices where no toothbrush can reach."

No mention is made of a single clinical test that might show that Stripe actually prevents dental decay in ordinary home use or even under supervised conditions. If such tests have been made, they certainly have never been reported in the scientific literature. We know of no evidence whatsoever which demonstrates that Stripe Toothpaste is a decay-preventive agent.

As for the antibacterial claims, hexachlorophene is a very effective germicide, and in the test tube it may be expected that it will destroy bacteria effectively. We do not yet know what laboratory tests were performed by the company to establish a basis for these statements of comparative efficacy. It may be that the well-known facts about the action of hexachlorophene in soap have simply been lifted and transferred to Stripe Toothpaste without direct study. Nothing in the literature would lead us to a more generous conclusion.

The effects of this ad are to claim that Stripe is a better decay-preventive than any other tooth paste, and to encourage the inadequate practice of brushing the teeth only once a day. The ad is therefore grossly misleading and inherently harmful.

IX. Co-op Tooth Paste • The last product I will bring to your attention is Co-op Tooth Paste. Probably you have never heard of it; it is not advertised. This tooth paste is a conventional cleansing dentifrice sold by National Cooperatives, Inc., through "co-op" stores in different parts of the country.

There are no ads for this toothpaste but I should like to submit for the record a copy

It keeps your breath close-up clean
Comes out striped
Stripe
New toothpaste with magic pink stripes
STRIPE with HEXACHLOROPHENE kills bad breath and decay germs...
better than any leading toothpaste
better than any leading mouthwash
even better than using both!
Stripe with HEXACHLOROPHENE

Figure 8

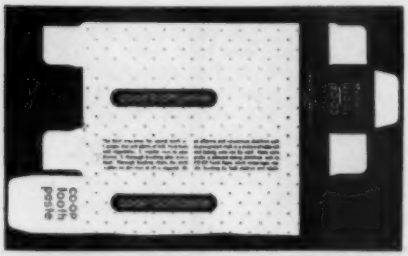

Figure 9

of the labeling on the box (Fig. 9.) I should like to read for you the message that occupies one side panel and is the only printed material on the carton besides the name:

"The best insurance for sound teeth is: 1) proper diet with plenty of milk, fresh fruits and vegetables; 2) regular visits to your dentist; 3) thorough brushing after every meal . . ."

This is sound health advice, which is in agreement with the advice of the best professional authorities in the country.

". . . Thorough brushing cleans the teeth—often no dentifrice at all is required . . ."

This statement is on the carton of a dentifrice package.

". . . Or an effective and inexpensive dentifrice such as precipitated chalk or a mixture of table salt and baking soda can be used . . ."

These simple and economical dentifrice preparations have been suggested by organized dentistry for years, and they are effective aids to the toothbrush when a mild polishing agent is desired.

". . . Many users prefer a pleasant-tasting dentifrice, such as CO-OP Tooth Paste, which encourages regular brushing by both children and adults."

There you have an honest appraisal, a clear enunciation of the only things a tooth paste should be expected to do, a sound set of dental health rules for everyone to follow, and a straightforward suggestion for those who may have to operate on a tight family budget.

The cost of a tube of Co-op Tooth Paste in Chicago was 29 cents when this package was obtained. At the same time, the same size tube of the high-powered "hard sell" tooth pastes was offered for 59 cents or more. The material I have presented to you at this hearing is intended to show that, as far as we are aware, there is no conclusive proof that any of the nationally advertised tooth pastes will do anything more for the consumer than an ordinary dentifrice like Co-op Tooth Paste. This rare example of forthright honesty and sincere concern for the welfare of the consumer makes very plain the essential issues in the whole matter.

X. Summary • In conclusion, I should like to summarize these issues.

1. The primary purpose of a dentifrice is to assist the toothbrush in cleaning the teeth. The cleansing process of brushing, with or without a dentifrice, removes potentially harmful food residues, and reduces the opportunity for acid-formation which is an important factor in causing tooth decay. Regular brushing also is advocated for the prevention of gingivitis and periodontal disease, and for the maintenance of hygienic conditions in the mouth.

2. Adequate scientific evidence has not yet been produced in support of the special decay-preventive claims that are made for nationally advertised dentifrices. The presence of various additives in these products has not been demonstrated to produce the effects ascribed to them in the promotional material.

3. The advertisements for most of the major dentifrices are grossly deceptive and misleading. Through the use of half-truths, pseudo-scientific statements, and distorted implications they tend to create a false sense of security about dental health. This is harmful because it leads people to neglect sound health habits. In some cases, the advertisements openly advocate disregard for the frequently essential practice of brushing the teeth after each meal.

4. It is obvious that the laws and regulations now in effect are not adequate to control the existing situation in the dentifrice advertising industry. Organized dentistry has fought these practices for years, but it is unable to cope with the problem in the absence of legal restraints and effective governmental regulating mechanisms. The situation goes from bad to worse every time a new dentifrice or a new promotional stunt is introduced. It shows no sign of abating in the foreseeable future, and as long as there is absolute freedom for the propagation of wild claims without factual support no significant change of direction should be anticipated.

5. The whole state of affairs cries out for remedy. The doctrine "Let the buyer beware" cannot be applied because the consumer is in no position to evaluate the claims. What is needed is some form of federal action, perhaps some new legislation with teeth in it (if I may use that figure of speech) which will effectively prevent the use of inaccurate, misleading or deceptive means to foist these dentifrice preparations upon the public. The Coun-

cil on Dental Therapeutics of the American Dental Association takes the logical view that the responsibility for proving the accuracy of the claims made for the usefulness and safety of a product rests directly with the manufacturer of the product. The Council does not hesitate to inform the profession when, in the Council's opinion, the claims for a product are not adequately supported by the facts. As long as present federal regulations prevail, manufacturers of highly competitive products will be encouraged to continue to outdo each other in exaggerating their claims and exploiting new but insignificant "gimmicks." The whole approach needs to be changed, in the interest of honesty and integrity in advertising, in the interest of the public welfare, and in the interest of giving 160,000,000 consumers a fair break. We earnestly hope that this Committee will recommend action toward the achievement of effective relief in this sorry situation.

BUREAU OF LIBRARY AND INDEXING SERVICE

American Dental Association Film Library

A revised edition of *Audio-Visual Materials in Dentistry* is in preparation and is scheduled for distribution about January 1, 1959. At that time a new schedule of rental fees listed in the catalog will go into effect. Films booked or scheduled before January 1, regardless of the date of showing, will be billed at the old rates. The new catalog will be mailed automatically to dental schools and dental societies. Other film users will be sent a new catalog on request.

The materials herein reviewed have been added to the Film Library collection.

REVIEWS

Billy Meets Tommy Tooth • 35 mm. filmstrip, color, 42 frames. Produced in 1958 by the National Apple Institute in cooperation with the American Dental Association. Rental $1. Can be purchased from Society for Visual Education, 1345 Diversey Parkway, Chicago.

Billy loses a tooth and puts it under his pillow. That night he dreams about his tooth personified as Tommy Tooth. Tommy says goodbye and explains that he is leaving so a bigger tooth can work for Billy. He explains the care that must be taken of the new tooth. Diet, toothbrushing and regular visits to the dentist are recommended. Suitable for instruction in primary grades.

Post Resection Endodontics • 16 mm., silent, color, 21 minutes. Revised in 1957 by David Green, D.D.S., 1 Hanson Pl., Brooklyn, N. Y. Rental $2.50. Producer may be contacted for purchase.

This film is a revision of the film "Endodontia and Immediate Apicurettage." In the care of a periapical involvement, the detailed steps of intervention are demonstrated. The root canal is reamed and disinfected. Excision of a periapical lesion is indicated before obturation of the canal. In surgery an oblique incision is used. After excision of the lesion and thorough cleansing, the periapical area is packed and the canal is obturated with gutta-percha. Postoperative examinations show bone regeneration. The technics employed reduce armamentarium and the use of drugs to a minimum.

Premedication for Reconstructive Dentistry of the Cerebral Palsy Patient • 16 mm., sound, color, 20 minutes. Produced in 1957 by the College of Medical Evangelists with a grant from Cooke Waite Laboratories. Production supervision by Niels Bjorn Jorgensen, D.D.S., with the cooperation of Drs. Levine and Hurley.

The film presents a series of cases demonstrating the problems and the technics used in the treatment of adult cerebral palsy patients. The effects of premedication and local anesthesia are demonstrated in six instances of cerebral palsy including the athetoid, chorioathetoid, spastic and rigid types.

Treatment of Anterior Crossbite • 2 by 2 slides, 94 slides with script. Produced in 1958 by Paul and Howard Grindlinger and Leonard Gorelick, 119-04 80th Road, Kew Gardens 15, Long Island, N. Y. Rental $1.50. Order De-

partment, American Dental Association, may be contacted for purchase.

A sequel to "Treatment of Posterior Crossbite" reviewed in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, October, 1957. The presentation is adapted to those interested in tooth movement, whether as an aid in periodontal treatment, part of full mouth rehabilitation or in preventive orthodontics.

Analytic methods and the following criteria are used to distinguish the simple case from the relatively complex: axial inclination, growth, centric relation, amount of space, degree of overbite. The first 38 slides are a consideration of the prognosis and treatment of a number of cases illustrating axial inclination and growth. Slides 39 to 56 concern centric relation or functional analysis—prognosis and treatment. Space and degree of overbite are considered in the last 37 slides. The accompanying guide is well organized and gives a detailed explanation of each slide, the criteria, treatment and appliances involved. The series is well documented and a bibliography is included.

Additions to the Library

The books listed here have been added recently to the Library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing books, but there is a minimal charge of fifty cents for package libraries. Most of these books may be purchased also through the Bureau. In addition practically all the dental journals published in the world at present are available to members on loan. Lists of books and package libraries are also available on request.

BOOKS

AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS. Transactions of the fourteenth annual meeting, St. Louis, Missouri, April 22-24, 1957. Harrisburg, Pa., 1957. 44 p. Mimeo.

AMERICAN ASSOCIATION OF ORTHODONTICS. SPECIAL COMMITTEE ON CEPHALOMETRICS. Workshop on roentgenographic cephalometrics, March 24, 25, 26, 1957, the Bolton Fund Headquarters, Western Reserve University, Cleveland, Ohio. New York, 1957. 336 p. Mimeo.

AMERICAN DENTAL ASSOCIATION. BUREAU OF ECONOMIC RESEARCH AND STATISTICS. Distribution of dentists in the United States by state, region, district and county. Chicago, 1958. 62 p.

AMERICAN DENTAL ASSOCIATION. BUREAU OF ECONOMIC RESEARCH AND STATISTICS. Facts about states for the dentist seeking a location. Chicago, 1958. 34 p.

AMERICAN DENTAL SOCIETY OF EUROPE. Transactions of the sixty-third meeting held at the Palais de Beaulieu, Lausanne, August 28 to 31, 1957. London, 1958. 77 p.

ASLANDER, ALFRED. Tooth formation in the light of plant nutrition. Stockholm, Division of Agriculture, Royal Institute of Technology, 1958. 20 p.

BELLO, B. V. & AREAL, P. G. E. Dentaduras implantadas; implant dentures. Rio de Janeiro, 1956. 217 p. $8.50. Text in Portuguese and English.

BODINE, R. L. Implant dentures. (Practical dental monographs, May 1958.) Chicago, Year Book Publishers, 1958. 40 p.

BRAUN, RICHARD. Schäden nach Anwendung zahnärztlicher Arzneimittel im Spiegel des Schrifttums. Inaugural-Dissertation. Munich, 1957. 60 p.

BRITISH DENTAL ASSOCIATION. Memorandum to the Royal Commission on the remuneration of National Health Service doctors and dentists. London, 1957. 34 p.

CORDOBA. UNIVERSIDAD NACIONAL. FACULTAD DE ODONTOLOGIA. La escuela de odontología y su transformación en facultad; antecedentes de su transformación de su fundación y reestructuración 1917-1957. Córdoba, Argentina, 1957. 109 p.

ENGSTRÖM, ARNE & OTHERS. Bone and radiostrontium. New York, Wiley, 1957. 139 p. $8.75.

FINN, S. B. Treatment of fractured teeth in children. (Practical dental monographs,

July 1958.) Chicago, Year Book Publishers, 1958. 38 p.

GARDNER, A. F. Management of osteoporosis; modern concepts. (Reprinted from American Practitioner and Digest of Treatment, May 1958, Vol. 9, No. 5.) Philadelphia, Lippincott, 1958. 32 p.

GEHL, D. H. & DRESEN, O. M. Complete denture prosthesis. Formerly by Rudolph O. Schlosser. 4th ed. Philadelphia, Saunders, 1958. 542 p. $11.

GLICKMAN, IRVING. Clinical periodontology; the periodontium in health and disease, recognition, diagnosis and treatment of periodontal disease in the practice of general dentistry. 2d ed. Philadelphia, Saunders, 1958. 978 p. $17.50.

GRESHAM, HALLAM. A manual of orthodontics. Christchurch, New Zealand, Peryer, 1957. 196 p. $11.50.

IVANCIE, G. P. Vincent's infection (necrotizing ulcerative gingivitis). (Practical dental monographs, March 1958.) Chicago, Year Book Publishers, 1958. 28 p.

JAY, PHILIP, BEEUWKES, ADELIA & BENSON, H. M. Dietary program for the control of dental caries. 4th ed. Ann Arbor, Mich., Overbeck, 1957. 32 p. $0.65.

MARGUERITE, RENÉ. Les dessins et sculptures en morphologie dentaire. Paris, Baillière, 1958. 109 p. 1,500 fr.

MASSLER, MAURY. Pulp protection and preservation. (Practical dental monographs, January 1958.) Chicago, Year Book Publishers, 1958. 47 p.

MAY, HANS. Reconstructive and reparative surgery. 2d ed. Philadelphia, Davis, 1958. 1,115 p. $30.

MAYER, D. M. & SWANKER, W. A. Anomalies of infants and children. New York, McGraw-Hill, 1958. 454 p. $12.

MILLER, N. E. Graphic communication and the crisis in education. (Audio-Visual Communication Review, Vol. 5, No. 3.) Washington, National Education Association, 1957. 120 p. $2.

MINER, L. M. S. Dental assistant. (American occupations No. 15.) Boston, Research Publishing Company, 1957. 31 p. $1.50.

NAGLE, R. J. & SEARS, V. H. Dental prosthetics; complete dentures. With the collaboration of Sydney I. Silverman. St. Louis, Mosby, 1958. 532 p. $11.50.

NOEPPEL, O. Pharmacologie et pharmacothérapie dentaire. Paris, Masson, 1958. 354 p. 3,500 fr.

ORBAN, B. J. & OTHERS. Periodontics; a concept-theory and practice. St. Louis, Mosby, 1958. 537 p. $14.50.

RÖCKERT, HANS. A quantitative x-ray microscopical study of calcium in the cementum of teeth. (Acta Odontologica Scandinavica, Vol. 16, Sup. 25.) Gothenburg, 1958. 68 p.

SCOTT, J. H. & SYMONS, N. B. B. Introduction to dental anatomy. 2d ed. Edinburgh, Livingstone, 1958. 344 p. $8.50.

SIMPSON, C. K. Forensic medicine. London, Arnold, 1958. 352 p. $7.

SINGER, CHARLES & OTHERS, editors. A history of technology. Vol. 4: the industrial revolution c. 1750 to c. 1850. Oxford, Clarendon Press, 1958. 728 p. $26.90.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Intracellular oxidative enzymes; pyruvic reductase in oral, ocular, liver, and brain cortex tissues, by Bertram Eichel, Heron E. Pena and Arnold A. Swanson. (Project No. 56-129.) Randolph, Texas, 1958. 8 p.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Physiologic chloride levels in human whole saliva elicited by rubber band stimulation, by Ira L. Shannon. (Project No. 57-142.) Randolph, Texas, 1957. 6 p.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Salivary sodium, potassium, and chloride levels in subjects classified as to dental caries experience, by Ira L. Shannon. (Project No. 58-74.) Randolph, Texas, 1958. 6 p.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Sodium and potassium levels of human whole saliva collected without exogenous stimulation, by Ira L. Shannon. (Project No. 58-49.) Randolph, Texas, 1958. 6 p.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Tranquilizing drugs in oral surgery, by Lucian Szmyd, Clarence M. McCall and Earl T. Enright. (Project No. 58-31.) Randolph, Texas, 1957. 5 p.

U. S. AIR FORCE. AIR UNIVERSITY. SCHOOL OF AVIATION MEDICINE. Whole saliva volume, sodium, potassium, and chloride; day-to-day comparisons under identical and diverse forms of stimulation, by Ira L. Shannon. (Project No. 58-83.) Randolph, Texas, 1958. 4 p.

WAGMAN, S. S. Manual of hypnosis in dentistry. Philadelphia, 1957. 30 p.

WEST, R. W., ANSBERRY, MERLE & CARR, ANNA. The rehabilitation of speech; a textbook of diagnostic and corrective procedures based upon a critical study of speech disorders. New York, Harper, 1957. 688 p. $7.50.

WHEELER, R. C. A textbook of dental anatomy and physiology. 3d ed. Philadelphia. Saunders, 1958. 413 p. $8.50.

COUNCIL ON DENTAL EDUCATION

Accredited dental hygiene schools

All of the dental hygiene programs which have been approved or provisionally approved are recognized by the Council on Dental Education as accredited. The schools in the following list designated with an asterisk (*) are provisionally approved. The others are approved.

Alabama

Department of Dental Hygiene
School of Dentistry
University of Alabama
1919 Seventh Avenue, South
Birmingham 3
Director, Gertrude M. Sinnett

California

Division of Dental Hygiene
School of Dentistry
University of California
The University Medical Center
San Francisco 22
Chairman, Victoria Krohr

Department of Dental Hygiene
School of Dentistry
University of Southern California
925 West Thirty-fourth Street
Los Angeles 7
Head, Ruth Vaughn

Connecticut

Fones School of Dental Hygiene
University of Bridgeport
400 Park Place
Bridgeport 4
Director, Robert H. W. Strang
Assistant director, Frances Dolan

District of Columbia

Department of Oral Hygiene
College of Dentistry
Howard University
600 W Street, N.W.
Director, Russell A. Dixon
Head, Alicia M. Howard

Illinois

Dental Hygiene Program
The Dental School
Northwestern University
311 East Chicago Avenue
Chicago 11
Director, George W. Teuscher
Supervisor, Evelyn Maas

Indiana

Curriculum for Dental Hygienists
School of Dentistry
Indiana University
1121 West Michigan Street
Indianapolis 2
Director, A. Rebekah Fisk

Iowa

Dental Hygiene Program
College of Dentistry
State University of Iowa
Iowa City
Co-ordinator, Helen M. Newell

Kentucky

*Curriculum in Dental Hygiene
School of Dentistry
University of Louisville
129 East Broadway
Louisville 2
Director, Edrie M. Lohri

Massachusetts

Forsyth School for Dental Hygienists
Forsyth Dental Infirmary
140 The Fenway
Boston
Director, Louise W. Hord

Michigan

Department of Oral Hygiene
School of Dentistry
University of Detroit
630 East Jefferson Avenue
Detroit 26
Director, Rene Rochon

Curriculum in Dental Hygiene
School of Dentistry
University of Michigan
Ann Arbor
Director, Dorothy G. Hard

Minnesota

Program for Dental Hygienists
School of Dentistry

University of Minnesota
Minneapolis 14
Director, Ione M. Jackson

Missouri

Courses for Dental Hygienists
School of Dentistry
University of Kansas City
1108 East Tenth Street
Kansas City 6
Director, M. Lorene Nelson

New Jersey

School of Dental Hygiene
Fairleigh Dickinson University
Teaneck
Director, Walter A. Wilson
Assistant director, A. Lombardi

New York

*Department of Dental Hygiene
Broome Technical Community College
Binghamton
Head, Duncan MacMillan

Courses for Dental Hygienists
School of Dental and Oral Surgery
Columbia University
630 West 168 Street
New York 32
Director, Frances A. Stoll

School for Dental Hygienists
Eastman Dental Dispensary
800 Main Street, East
Rochester 3
Director, Basil G. Bibby
Principal, Ruth Vann

Dental Hygiene Curriculum
Erie County Technical Institute
1685 Elmwood Avenue
Buffalo 7
Director, Albert E. Roberts

Dental Hygiene Department
State University of New York
Long Island Agricultural and
Technical Institute
520 Conklin Street
Farmingdale, Long Island
Director, Kendall P. Thomas

Department of Dental Hygiene
New York City Community College
of Applied Arts and Sciences
300 Pearl Street
Brooklyn 1
Director, Mabel Gross

North Carolina

Curriculum for Dental Hygiene
School of Dentistry
University of North Carolina
Chapel Hill
Director, Grover C. Hunter, Jr.

Ohio

Division of Dental Hygiene
College of Dentistry
The Ohio State University
Columbus 10
Director, Consuelo Wise

Oregon

Department of Dental Hygiene
University of Oregon Dental School
611 S.W. Campus Drive
Sam Jackson Park
Portland
Head, Evelyn R. Hannon

Pennsylvania

Temple University School of
Oral Hygiene
3223 North Broad Street
Philadelphia 40
Supervisor, Margaret A. Bailey

Courses in Oral Hygiene
School of Dentistry
University of Pennsylvania
4001 Spruce Street
Philadelphia 4
Director, Harrison M. Berry
Supervisor, Charlotte J. Sullivan

Tennessee

*Division of Dental Hygiene
School of Dentistry
Meharry Medical College
1005 Eighteenth Avenue, North
Nashville 8
Acting director, Elzer S. Chandler

Courses in Dental Hygiene
College of Dentistry
University of Tennessee
847 Monroe Avenue
Memphis 3
Director, Sarah E. Hill

Texas

Caruth School of Dental Hygiene
Baylor University
800 Hall Street
Dallas 10
Director, Patricia A. Clendenin

School of Dental Hygiene
The University of Texas

Dental Branch
P. O. Box 20068
Houston 25
Director, Mary Drake Horton

Vermont

School of Dental Hygiene
University of Vermont
590 Main Street
Burlington
Director, Wadi I. Sawabini

Washington

Department of Dental Hygiene
School of Dentistry
University of Washington
Seattle 5
Director, Esther M. Wilkins

West Virginia

Department of Dental Hygiene
West Liberty State College
West Liberty
Director, Roxie M. Stitzer

Wisconsin

Department of Dental Hygiene
School of Dentistry
Marquette University
604 North Sixteenth Street
Milwaukee 3
Director, Elizabeth Linn

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

The ILWU-PMA dental program: first-year statistics. III. Length of time since last visit to a dentist

Dentists participating in the ILWU-PMA dental program were asked to indicate on the examination chart whether the patient had received dental care previously and, if so, the date of the most recent visit to a dentist. The tables in this chapter refer to the length of time between the first visit under the program and the last preceding visit. No record

The first and second articles of this series appeared in The Journal in August and September 1958.

Table 9 • Percentage distribution of patients by length of time since last visit to a dentist, according to age

Length of time	Age							Total	Mean age
	1-2	3-4	5-6	7-8	9-10	11-12	13-14		
1 to 3 mo.	.0	1.4	2.0	3.0	2.0	3.0	2.5	2.3	9.3
4 to 6 mo.	1.2	1.4	4.4	7.3	8.5	7.0	7.7	6.1	9.7
7 to 9 mo.	.0	.9	4.2	4.1	5.1	6.7	5.0	4.3	9.7
10 to 12 mo.	.0	1.8	8.7	14.8	16.3	16.1	19.7	13.0	10.1
13 to 18 mo.	.0	.3	2.0	3.8	4.1	5.7	5.7	3.7	10.3
19 to 24 mo.	.0	.4	1.9	3.0	5.4	6.9	6.0	4.0	10.5
25 to 36 mo.	.0	.2	1.1	2.6	4.3	5.7	4.5	3.1	10.6
More than 3 yr.	.0	.0	.2	1.5	3.5	3.9	5.4	2.5	11.3
No previous care	67.1	62.8	47.8	29.0	22.3	17.7	14.4	32.0	6.7
Unknown	31.7	30.8	27.7	30.9	28.5	27.3	29.1	29.0	8.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	8.5
Mean (months)	5.3	9.2	11.7	13.4	15.9	16.5	17.9	15.5	

was made of the length of time between the initial episode and the recall episode since this period did not vary much above or below six months.

The average length of time since the last visit to a dentist, among the 39.0 per cent of the patients known to have had previous care, was 15.5 months (Table 9). Unfortunately, "length of time" was not recorded for 29.0 per cent of the patients. Another 32.0 per cent had never been to a dentist prior to the initial visit under the program.

Only four of the 322 children aged 1 and 2 had previously been to a dentist, and the average time since the last visit was only 5.3 months. As would be expected, with each higher age group a higher percentage had previously received dental care. More surprising is that the average length of time since the last treatment also increased substantially with age, from 5.3 months at ages 1 to 2 and 9.2 months at ages 3 to 4, to 17.9 months at ages 13 to 14.

Girls averaged 15.2 months since the last dental care compared to 15.9 months for boys (Table 10). Thus, the sex differences in receipt of dental care among children is in the same direction, though

Table 10 • Percentage distribution of patients by length of time since last visit to a dentist, according to sex

Length of time	Per cent of patients		
	Boys	Girls	Total
1 to 3 mo.	2.4	2.3	2.3
4 to 6 mo.	5.2	7.0	6.1
7 to 9 mo.	4.6	4.1	4.3
10 to 12 mo.	12.4	13.6	13.0
13 to 18 mo.	3.6	3.7	3.7
19 to 24 mo.	4.1	3.9	4.0
25 to 36 mo.	3.1	3.1	3.1
More than 3 yr.	2.7	2.3	2.5
No previous care	32.6	31.3	32.0
Unknown	29.3	28.7	29.0
Total	100.0	100.0	100.0
Mean (months)	15.9	15.2	15.5

Table 11 • Percentage distribution of patients by length of time since last visit to a dentist for the nine plans

Length of time	San Francisco Service	San Francisco Insured	Wilmington Service	Wilmington Insured	Oregon Service	Oregon Insured	Washington Service	Washington Insured	California Small Ports Insured
1 to 3 mo.	1.3	2.8	3.7	3.9	2.7	*	.7	2.5	1.6
4 to 6 mo.	2.1	10.6	7.2	8.1	10.8	*	2.2	5.0	2.2
7 to 9 mo.	1.1	7.9	1.9	6.1	9.4	*	2.2	10.0	3.6
10 to 12 mo.	6.2	7.3	10.2	6.8	14.7	*	29.2	12.5	7.1
13 to 18 mo.	1.1	7.1	2.2	6.8	6.5	*	1.4	3.8	4.4
19 to 24 mo.	2.4	4.0	5.5	4.4	4.6	*	2.9	10.0	4.0
25 to 36 mo.	1.5	3.2	3.2	3.6	4.7	*	2.2	1.2	5.6
More than 3 yr.	1.5	2.4	2.5	2.3	2.7	*	2.8	1.2	4.2
No previous care	18.7	13.6	55.3	19.9	27.7	*	42.0	18.8	28.2
Unknown	64.1	41.1	8.3	38.1	16.2	*	14.4	35.0	39.1
Total	100.0	100.0	100.0	100.0	100.0	*	100.0	100.0	100.0
Mean (months)	17.0	14.2	15.7	14.4	14.2	*	16.2	13.9	22.3

*Too few cases for reliable statistics.

Table 12 • Dental services received in initial episodes, by length of time since last visit to a dentist

Service	1 to 3 mo.		4 to 6 mo.		7 to 9 mo.		10 to 12 mo.		13 to 18 mo.		19 to 24 mo.		25 to 36 mo.		More than 3 yr.		No previous care		Unknown		Total	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.
Examination and completion of forms	86.6	.88	90.5	.91	84.0	.85	94.4	.95	83.2	.84	92.9	.94	91.0	.91	88.0	.88	94.5	.96	80.9	.82	88.9	.90
Prophylaxis, including scaling and polishing	63.7	.65	62.9	.65	63.6	.64	53.9	.55	59.3	.60	64.8	.66	63.9	.67	56.8	.59	55.2	.57	61.4	.63	58.7	.60
Full mouth roentgenograms	39.7	.40	33.3	.34	23.1	.23	30.2	.31	27.7	.28	42.3	.43	31.6	.32	37.5	.39	27.2	.27	33.1	.33	30.8	.31
Bitewing roentgenograms	38.5	.48	52.6	.76	56.5	.89	69.0	.88	55.8	.86	52.2	.68	61.1	.85	55.7	.74	60.9	.74	43.1	.51	54.9	.70
Single roentgenogram	22.3	.55	26.1	.63	21.6	.57	24.3	.58	22.0	.68	24.2	.70	27.9	.77	27.1	.77	23.8	.58	17.4	.44	22.2	.56
One-surface amalgam filling	73.2	2.46	68.8	2.30	68.6	2.23	76.1	2.70	75.8	2.69	76.1	2.97	77.9	3.07	80.2	3.29	57.4	2.08	61.6	2.22	65.2	2.35
Two-surface amalgam filling	69.3	2.12	67.6	1.96	64.2	1.75	75.6	2.35	68.8	2.07	70.6	2.21	74.2	2.36	67.2	2.02	57.0	2.02	55.1	1.88	61.9	2.03
Three-surface amalgam filling	26.3	.42	23.4	.40	26.9	.18	34.9	.70	26.3	.46	29.4	.58	32.4	.70	37.0	.82	22.1	.44	23.0	.44	25.5	.50
Four-surface amalgam filling	1.7	.02	1.9	.02	1.5	.03	4.0	.06	1.8	.02	2.6	.04	3.3	.04	3.1	.04	2.6	.04	4.1	.06	3.1	.04
One-surface acrylic filling	2.2	.03	3.4	.10	3.6	.11	6.6	.24	2.8	.04	2.6	.07	3.7	.10	4.2	.17	1.8	.06	2.3	.07	2.9	.10
Two-surface acrylic filling	.6	.01	.8	.02	.6	.01	1.0	.02	.4	—	.3	—	.4	—	1.0	.02	.3	.01	.1	—	.4	.01
One-surface silicate filling	14.0	.59	14.9	.46	17.5	.60	21.2	.74	17.9	.55	19.4	.58	21.3	.75	18.2	.68	6.5	.22	12.2	.39	12.9	.43
Two-surface silicate filling	.6	.01	.6	.01	.3	.01	.8	.02	.7	.02	1.0	.01	1.2	.02	2.6	.04	.3	.01	.6	.01	.6	.01
One-surface temporary filling	5.6	.08	4.4	.08	.9	.02	3.2	.07	4.6	.10	5.5	.08	5.7	.11	6.2	.13	5.9	.10	.9	.02	3.7	.07
Two-surface temporary filling	2.8	.03	1.9	.03	1.2	.02	1.6	.02	.4	—	4.2	.06	2.0	.02	3.6	.06	3.3	.05	.3	.01	1.9	.03
Three-surface temporary filling	1.1	.01	.8	.02	.6	.01	.4	.01	.7	.01	.3	—	.4	—	2.6	.05	.9	.01	—	—	.6	.01
Permanent crown	2.8	.04	2.5	.05	2.7	.04	2.2	.04	2.5	.05	1.6	.02	2.9	.05	2.1	.03	1.0	.02	1.2	.01	1.6	.03
Temporary crown	1.7	.02	.8	.02	.3	.01	1.5	.02	.7	.02	1.0	.02	.4	—	.0	.00	1.4	.03	.8	.02	1.0	.02
Partial denture	1.7	.03	1.1	.01	.3	.01	.3	—	.4	.01	1.0	.02	.8	.01	.0	.00	.6	.01	.6	.01	.6	.01
Space maintainer	10.1	.13	4.6	.05	3.3	.05	4.7	.06	3.9	.05	6.1	.09	4.1	.06	5.2	.08	4.0	.05	5.9	.07	4.9	.06
Study models	5.6	.06	5.9	.06	1.2	.01	4.0	.04	2.5	.02	5.2	.05	3.7	.04	4.7	.05	2.7	03	.4	—	2.6	.03
Denture adjustment	2.8	.03	2.1	.04	1.2	.02	2.1	.06	1.4	.03	3.5	.08	1.2	.02	2.6	.07	1.3	.03	2.3	.05	1.9	.04
Denture repairs	.6	.01	.4	.01	.3	—	.9	.01	.7	.01	.6	.01	.8	.01	1.0	.01	.8	.01	.6	.01	.7	.01
Sodium fluoride treatment	7.3	.22	10.7	.40	10.1	.35	11.3	.43	8.1	.27	4.8	.18	6.6	.26	4.2	.17	9.8	.38	7.4	.22	8.8	.32
Periodontal treatment	.6	.01	.8	.02	1.2	.01	.2	—	.4	.01	.0	.00	.4	—	2.1	.05	.5	.01	.4	.01	.4	.01
Pulp cap	5.0	.05	2.9	.05	5.0	.08	8.5	.13	7.4	.14	7.1	.10	11.1	.16	8.9	.16	6.7	.11	6.2	.08	6.7	.10
Therapeutic pulpotomy	1.7	.02	1.1	.02	.3	—	1.1	.01	.4	—	1.0	.01	.8	.01	.5	.01	1.4	.02	.7	.01	1.0	.01
Vital pulpotomy	5.0	.07	1.3	.02	2.4	.02	2.3	.03	1.4	.02	3.2	.04	6.1	.09	2.6	.03	4.9	.07	5.7	.09	4.3	.06
Extirpation of pulp	1.1	.02	.4	—	1.2	.01	.9	.01	1.4	.02	.6	.01	1.2	.01	.5	.01	.4	.01	.6	.06	.7	.01
Simple extraction	27.4	.56	22.5	.45	19.8	.40	29.2	.63	27.4	.57	29.4	.59	33.6	.77	35.9	1.03	25.5	.64	25.6	.58	26.4	.61
Complex extraction	.0	.00	.4	—	.6	.01	.2	—	—	—	.6	.01	.8	.12	1.6	.02	.3	—	.5	.01	.4	.01
Other surgical procedure	.6	.01	.6	.01	.9	.03	.5	.01	.7	.01	.0	.00	.8	.01	.5	.01	.2	—	.3	—	.4	.01
Broken appointment	16.8	.30	17.5	.32	11.2	.19	15.4	.30	9.5	.18	17.7	.35	20.5	.43	18.7	.40	22.6	.42	27.1	.52	21.2	.40
Behavior problem	.6	.01	.8	.01	.3	—	.2	—	.0	.00	.0	.00	2.0	.02	.5	.01	1.3	.02	1.1	.02	.9	.01
Anesthetic	1.1	.01	1.1	.01	.3	—	.5	—	1.1	.01	.3	—	1.2	.01	3.1	.04	1.0	.01	1.0	.01	.9	.01
Penicillin	.6	.01	.2	—	.0	.00	.5	.01	.0	.00	.6	.02	.4	—	1.0	.03	.2	—	.2	—	.3	—
Unclassified	1.7	.02	1.5	.01	.0	.00	1.5	.02	.7	.01	.3	—	1.6	.03	.5	.01	1.3	.01	.2	—	.9	.01

Note: "%" means the percentage of patients needing the specified dental service. "Avg." means the average number of services needed among all patients, including those with no need.

Table 13 • Average number of fillings (excluding temporary fillings) received, by length of time since last visit to a dentist and by age

Length of time	Age			
	1-4	5-9	10-14	All ages
1 to 3 mo.	*	5.14	6.11	5.69
4 to 6 mo.	*	4.84	5.75	5.31
7 to 9 mo.	*	4.23	5.97	5.20
10 to 12 mo.	*	6.04	7.46	6.84
13 to 18 mo.	*	5.58	5.98	5.85
19 to 24 mo.	*	6.73	6.31	6.48
25 to 36 mo.	*	6.73	7.28	7.06
More than 3 yr.	*	6.42	7.28	7.08
No previous care	2.76	5.68	6.28	4.89
Unknown	2.00	5.24	6.19	5.09
Total	2.64	5.53	6.48	5.45

*Too few cases for reliable statistics.

not nearly so pronounced, as among adults. Several studies have shown that women see the dentist much more often than men.

Information on race was recorded for relatively few patients. Of the 180 known nonwhite patients, 64 per cent had never been to a dentist. Of those who had been to a dentist, the average length of time was 21.2 months, compared to 15.2 months among the white patients.

Some significant differences appear in the table on dental care previously received by patients in each of the nine separate plans into which the program was divided (Table 11). The percentage of patients for whom "length of time" information was not recorded varied from 8.3 per cent in the Wilmington service plan to 64.1 per cent in the San Francisco service plan. The percentage of patients known to have received no previous care also varied greatly, from 13.6 per cent in the San Francisco insured plan to 55.3 per cent in the Wilmington service plan.

It will be noted in Table 11 that the percentage of patients with no previous care and the average length of time since last dental visit are in all instances higher for the service plan than for the corresponding insured plan. This difference may be explained by the fact that insured plans all had a limit on the amount of service available to the individual patient whereas the service plans did not. Apparently, then, children with much accumulated dental disease tended to choose service plans. Those with better dental health could select the insured plans without penalty because their dental bills would not exceed the specified limit.

Obviously, for several of the services listed in Table 12 the variation in statistics according to "length of time" is a random, insignificant variation. In the statistics relating to operative dentistry, however, there is a meaningful pattern of variation.

The need for fillings and extractions was lowest in the "7 to 9 months" group. The averages for all types of fillings combined (except temporary fillings) are shown in Table 13, which also shows differences by age groups within "length of time" groups. Comparable data on number of tooth surfaces filled are presented in Table 14, and data on simple extractions in Table 15.

The reason why need for fillings and extractions was greater in the "1 to 3 months" and the "4 to 6 months" groups than in the "7 to 9 months" group is not

Table 14 • Average number of tooth surfaces filled per patient (excluding temporary fillings), by length of time since last visit to a dentist and by age.

Length of time	Age			
	1-4	5-9	10-14	All ages
1 to 3 mo.	*	8.48	8.87	8.78
4 to 6 mo.	*	7.61	8.83	8.24
7 to 9 mo.	*	7.03	8.75	8.00
10 to 12 mo.	*	10.03	11.41	10.80
13 to 18 mo.	*	8.79	8.96	8.93
19 to 24 mo.	*	11.42	9.22	9.99
25 to 36 mo.	*	11.14	11.01	10.99
More than 3 yr.	*	10.30	11.13	10.95
No previous care	4.42	9.68	9.33	7.93
Unknown	3.06	8.75	9.35	8.04
Total	4.20	9.25	9.75	8.67

*Too few cases for reliable statistics.

Table 15 • Simple extractions received, by length of time since last visit to a dentist and by age

Length of time	Age							
	1-4		5-9		10-14		All ages	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.
1 to 3 mo.	*	*	31.2	.61	28.1	.60	27.4	.56
4 to 6 mo.	*	*	26.1	.52	20.4	.41	22.5	.45
7 to 9 mo.	*	*	21.3	.42	19.0	.40	19.8	.40
10 to 12 mo.	*	*	35.9	.79	25.2	.53	29.2	.63
13 to 18 mo.	*	*	34.3	.77	24.0	.48	27.4	.57
19 to 24 mo.	*	*	38.5	.79	25.7	.51	29.4	.59
25 to 36 mo.	*	*	44.9	1.12	28.2	.61	33.6	.77
More than 3 yr.	*	*	55.8	1.70	30.2	.83	35.9	1.03
No previous care	5.2	.11	33.8	.88	37.3	.90	25.5	.64
Unknown	3.1	.05	30.0	.74	30.2	.64	25.6	.58
Total	4.7	.10	32.6	.79	28.3	.62	26.4	.61

*Too few cases for reliable statistics.

entirely clear. Possibly the group having seen the dentist within six months includes a large number of patients with a higher than average rate of decay. In general, a doubling of the length of time since the last visit to a dentist is not accompanied by a doubling of need for dental care. Undoubtedly the incidence or rate of occurrence of dental decay has a considerable bearing on the frequency of visits to the dentist; that is, those patients with a high decay rate tended to have seen their dentist more recently than those with a low decay rate.

Adding fillings and extractions in terms of number of tooth surfaces indicates that patients who had seen their dentist seven to nine months previously, required treatment for 10.05 surfaces, compared to 16.20 surfaces for patients who had not seen their dentist for more than three years.

The need for fillings was least among the patients who had never been to a dentist (Table 13). This undoubtedly reflects the fact that this age group was younger on the average than any of the "length of time" groups (Table 9).

The next article in this series will present statistics on the nine separate plans that composed the ILWU-PMA dental program.

COUNCIL ON DENTAL HEALTH

Explanation of "State Dental Division Program Survey and Cost Estimate Form" from standpoint of state dental society

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The "State Dental Division Program Survey and Cost Estimate Form" has been developed by the American Dental Association's Council on Dental Health in cooperation with the American Association of Public Health Dentists to assist the state dental division and the dental society in establishing their program content and, thereby, to provide the information needed to support any effort to obtain state funds for the program. In addition, such information is to furnish the American Dental Association's Council on Legislation with documentation of the need for federal matching grants to assist in developing state dental public health activities.

The basic requirement in the state dental society's responsibility for effective use of the form is an efficient operating agency. Since the Missouri State Dental Association recently has gone through the throes of reorganizing its council on dental health, its experience will serve as a demonstration of one approach to meeting that basic requirement.

REORGANIZATION OF COUNCIL

It seemed to be the concensus of dentists in Missouri that before a workable program could be initiated, there would have to be a reorganization of the council on dental health. The structure of the council before the new bylaws were adopted was such that each of the eight districts elected a representative. The chairman was appointed on a yearly basis by the association's president. Because of this type of organization, with the council personnel changing yearly, the members did not have time to acquaint themselves with their many duties. Therefore, confusion prevailed throughout the state and district councils.

The council, prior to 1957, was entirely too large. It lacked coordinated effort, there was very little interest and absolutely no continuity of ideas. Each council had to be re-educated each year. Consequently, all action from these councils came too late for any concentrated effort by the Missouri State Dental Association to present the Bureau of Dental Health of the Division of Health of Missouri with any concrete programs. Naturally, the bureau was handicapped in trying to get programs to the council for its action.

In 1957, through the splendid efforts of Dr. Joseph V. Kirby, the bylaws were revised and adopted by the executive council. These bylaws called for the council to be a five-man committee, with the members and chairman elected by the executive council. The terms of office were set up as follows: One for one year,

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Chairman, council on dental health, Missouri State Dental Association.

two for two years, two for three years, and, thereafter, as each term of office expires, replacements will be made for three-year terms. No member will serve more than two three-year terms. The chairman is elected for one year but may be re-elected at the discretion of the executive council. The director of the Bureau of Dental Health is a member ex officio of the council on dental health. This arrangement provides for a functional organization that is more fluid in action, for continuity of effort and for an understanding of dental health problems at all levels of private and public practice.

Specifically, the responsibilities of the council on dental health are as follows:

The Council on Dental Health shall make its own rules for the conduct of its business in conformity with the Constitution and Bylaws of the Missouri State Dental Association. The Council on Dental Health shall give a written report to the Executive Council annually and such further reports as it requests. The Council on Dental Health shall be authorized to publish and distribute to the membership of the Missouri State Dental Association a Council on Dental Health Newsletter. It shall be the duty of each district chairman to report quarterly all Council on Dental Health activities within his district to the State Council on Dental Health. The duties of the Council on Dental Health shall be:

To conduct a continuous study of the problems associated with the production and distribution of dental care.

To maintain a comprehensive program of oral health educational service.

To motivate and work with local societies in developing similar programs.

To develop policy recommendations to the Society through the State Executive Council.

The Council on Dental Health shall act in an advisory capacity to the Bureau of Dental Health of the State Government's Division of Health.

The District Council on Dental Health shall consist of not less than six members in good standing in the Missouri State Dental Association. Members shall serve for three years and may be elected by the District or appointed by the District President. No member shall serve more than two consecutive three-year terms. The administrative organization of the District Council shall be determined by the vote of its members, and shall include a Chairman and a Secretary, elected annually. The duties of the District Councils on Dental Health shall be to study and promote programs on the local level in conformity with and subject to the principles applying to the duties of the State Council on Dental Health. District Councils shall hold at least two meetings annually and shall assist in the programs of the State Council on Dental Health. Local problems requiring support and guidance may be referred to the State Council on Dental Health. The District Council on Dental Health shall maintain a Speakers' Bureau.

The district societies do not elect officers at the same time each year, and, with the constant change, it was always a problem for the members of the council on dental health to be active at the state level. With only five members, it is now possible to have meetings at a preset date and be relatively sure all the members will be present. Then, too, it was felt that it takes a new member at least a year to become oriented as to the working of the council.

This new plan is much more efficient than the ones previously used, because it has resulted in a greater exchange of ideas, methods and aims of plans in cooperation with the Bureau of Dental Health.

Subcommittees can very well be set up to handle other problems which arise, such as Children's Dental Health Week, group purchase programs, budget payment plans, service corporations and the dental aspects of the Medicare program. These subcommittees can well be handled by members of the council serving as chairmen, thereby relieving the council chairman so that he may be free to work with all phases proficiently, rather than to be saddled with the responsibility of attempting to supervise all these activities —an assignment which, of course, is a physical and mental impossibility.

ANNUAL FEE SURVEY

The importance of close relationship and cooperation with the Bureau of Dental

Health is exemplified in the annual fee survey in Missouri. Dr. Forest Kindred of Kansas City, Mo., is to be highly commended for his efforts in initiating this program and also for motivating its continuity. This survey gives the dentists of Missouri the opportunity of comparing their fees with others of their own district and also with dentists of other districts throughout the state. It is vital that this survey be kept current, because it has been of paramount importance in renegotiating the Veterans Administration fee schedule which has been raised approximately one-fifth over the schedule of two years ago. The survey will also give definite data, by districts, if and when the profession is confronted with organized groups desiring dental care as a benefit of employment. In addition, it will help in the setting up of programs of dental care for public assistance welfare patients.

In this survey, the questionnaire is sent from the central office the latter part of March each year on the assumption that every dentist will have his books for the past year current, since he will soon have to file his income tax. Each dental procedure is listed on the questionnaire, with blank spaces for the dentists to fill in fees and other pertinent information that the committee desires, such as: age, average hours worked per week, number of dental assistants, dental assistants' average salary, gross income, net income before taxes, whether the dentist practices full time or part time, how many months he spent in private practice during the year, the character of his practice—that is, general practice or one of the listed specialties.

The Division of Health has tabulated the returns for the past three years on electronic tabulating machines, so that certain rigid restrictions must be made to facilitate the use of the machinery. There is not the latitude requested by some dentists in reporting fees charged, so they are asked to try to give as accurate a picture as possible and at the same time meet the instructions set forth. Some of their instructions are:

1. Do not report a fee range such as $1.00-$5.00. State the fee most often charged, or a combination fee such as between $1.00-$5.00 as $3.00.
2. Do not use qualifying statements, as "and up." For example, do not report $3.00 and up. State fee you most often charge.
3. If a question does not apply to you, draw a line through the answer space. This indicates that you have not missed the question.
4. As far as is possible, try to state answers to the nearest dollar. For example, $1.75 should read $2.00. Space limitations prohibit us from using parts of dollars in the survey.

DENTAL MANPOWER SURVEY

In Missouri, there is a very fine liaison between the state association and the State Board of Dental Examiners. Such liaison is felt to be most important, since the board is the only body which contacts every dentist in the state. The dental manpower survey could not be carried out by any other committee or body as effectively as by using the procedure of sending a questionnaire which must be filled out and returned with the renewal of each license. The board has always handled its secretarial work independently of the state association, but under the new plan, the board will place the postage on the association's postage meter, and the questionnaires will be run through the machine which will meter and seal in one operation. This arrangement will save the board a good deal of time, since it would have had to seal and stamp each one.

The questions asked are: name, office address, city and county, date and place of birth, dental school graduated from, character of practice, name of hospital of which the dentist is a staff member, extent of practice (such as active, full or part time, retired, other occupation than dentistry) and type of practice (that is, private, industrial, institutional).

When this information has been gathered, the department of rural sociology, University of Missouri, will conduct a study of dental manpower. The results will be reported to the state dental association for application at the county and district level.

It can be seen readily that the foregoing information will be most valuable to both the Bureau of Dental Health and the Missouri State Dental Association in locating dental deficiencies and in predicting future areas where dentists will be needed.

ANNUAL WORKSHOP CONFERENCE

It has been common practice in the past for the state association to hold a District Officers' Conference. Knowing that both the state and district councils on dental health must work in close association with these officers, the executive council, in 1956, approved the combination of this meeting with a workshop. The physical setup for this workshop was patterned after the National Dental Health Conference.

In 1957, the first workshop was conducted, and three subjects were considered: dental health education, prepaid-postpaid dentistry (group purchase and budget payment) and practice administration. The attendance and interest were far greater than expected. Therefore, the council on dental health recommended to the executive council that the workshop be made an annual affair, and the recommendation was readily accepted.

In regard to the Bureau of Dental Health, it is felt that the workshop provides an excellent opportunity to coordinate the efforts and knowledge of the council and the bureau. The workshop also helps in getting the council members and the district officers to know the health department officials and to understand their problems, thereby effecting a better understanding between the two groups.

In 1956, the Bureau of Dental Health budgeted $500 to apply toward the workshop expenses. This amount, with $1,000 which was the total budget for the council on dental health, was adequate for a total workshop cost of less than $900. However, the council realized that future workshops would be more expensive, since two of the essayists had been American Dental Association staff members and required no honoraria, only expenses. So, in 1957, the budget committee, realizing the importance of the project, allocated $1,500 for the 1958 workshop as well as $2,000 for the council on dental health budget. The total cost of this workshop was $1,043.

STATE DENTAL HEALTH PROGRAM

Missouri dentists feel most fortunate because the state's director of health, Dr. H. M. Hardwicke, was very sympathetic toward the efforts of the dental association and the Bureau of Dental Health to establish and promote a good state dental health program. As a result, the Division of Health obtained the assistance of the United States Public Health Service in reorganizing the Bureau of Dental Health and setting up a program. It was at this time that Dr. John Frankel came to Missouri from California. He, along with Dr. Howard Mehaffey, presented the council on dental health with a comprehensive program for 1958-59 that was approved unanimously by the council on March 3, 1958.

There is not time, manpower nor finances at present to carry out the proposed eight-point program, but it is felt to be a start in the right direction. With an increase in bureau personnel and in appropriations by the legislature, the council hopes to accomplish the eight projects in the near future. As the projects are described, it should be borne in mind that the council on dental health expects to cooperate by stimulating and motivating the dentists of the state to as-

sist the Bureau of Dental Health, in any way possible, in carrying out its program:

1. A survey of dental needs and resources of the state of Missouri designed to determine the extent of the present situation and, through projection, to show the future problem areas.

This survey is to be accomplished through cooperative efforts on the part of the Missouri State Dental Association and the Division of Health's Bureau of Dental Health. The objective is to determine the total needs and resources of Missouri.

The responsibilities of the Missouri State Dental Association shall be to accomplish the dental manpower study—number and kind of dental specialists, fee statistics, type of practice, location of practice, capacity of dental schools to produce dentists, dental hygienists and other auxiliary personnel, as well as the capacity of other training facilities for dental manpower within the State.

2. A project to provide dental services designed to maintain or increase the productivity of the aged population of a community.

This project is being sponsored by the Division of Health, as a whole, and has as its objective the improvement of the health of the community's aged population, utilizing, as needed, the whole spectrum of activity of a public health program. The role of the Division of Health will be the provision of its personnel in the project activity. Funds and services will be furnished by local community resources through service clubs, voluntary and public agencies and professional groups.

3. A study of dental disease present in the indigent aged population of a county.

This study is part of a more comprehensive multiphasic disease study to be undertaken by the Division as a whole. Approximately ten diseases ultimately will be included in the survey, of which the dental study will be but a part. For the purpose of the over-all study, dental disease will be considered as a single entity, but in reality, the dental study will include a rather complete inventory of the population's dental condition.

4. A project to determine the impact of a total dental health education program on utilization of dental services and on personal oral hygiene in a school population in Missouri.

The dental profession has been promoting dental health education for many years. It is felt that through such activity people can be motivated to be more conscious of their mouths, perform better personal oral hygiene and seek dental care more diligently.

Unfortunately, there has been relatively little effort made to evaluate such educational programs in terms of achieving objectives. This study proposes to do just that: to measure the impact of a dental health education program on motivating children to better oral hygiene and more dental care.

The study will begin with a base-line survey of the caries experience of the study group—without prior alerting of the community to the purpose of the study. If possible, an oral hygiene index will also be used in this determination (Greene's or other) to establish a base line of personal oral hygiene for the group.

The group will then be subjected to a well-rounded program of dental health education that will include graded classroom instruction, referral and follow-up for dental care, classroom toothbrush drills, parent orientation through the Parent-Teachers' Association and service clubs, and any other method practical and calculated to achieve the objective.

This program will be followed for a full school year. In the spring before the termination of school or in the fall following the reopening of school, a resurvey will be made of the group to determine the new status of the group's dental care and oral hygiene. The change in percentage composition of the "M"

(especially teeth indicated for extraction) and "F" components of the total DMF should reflect the efficacy of the program. A change in the "oral hygiene" index should reflect the efficacy of this phase of the program.

An attempt will be made to select a community where there has been no organized dental health education program within the past ten years.

5. A program to reduce dental caries by topical application of sodium fluoride to teeth of children, using a dental hygienist under dentist's supervision.

The project will be one in which a dental hygienist uses the multiple-chair technic to apply sodium fluoride to the teeth of a group of children in a selected community. The objective will be to utilize this method of prevention to reduce by 40 per cent the incidence of dental decay in the group and to establish the efficacy of this procedure in rural areas of Missouri where fluoridation of public water is not feasible.

6. A project to motivate a few selected communities to fluoridate their public water supplies.

The progress of fluoridation in Missouri has been slow but steady. At present writing, there are 17 water supplies in the state where the fluoride level has been adjusted to optimum levels. The fluoridation potential for the state is approximately 300 public water supplies.

Although there has been sporadic local interest in the subject, there has been no directed state-wide effort to increase the number of fluoridated water supplies through a systematic and coordinated approach.

It is the purpose of this project to select a very modest quota of communities in the state and then to help those communities to gain water fluoridation. This purpose would be accomplished by a joint cooperative program of the council on dental health of the Missouri State Dental Association with the Bureau of Dental Health.

7. A project to provide dental care for the indigent child population of a community through the use of a public clinic.

8. A project to stimulate a community without dental services to obtain a dentist.

Missouri has several counties and many communities which have either no dentists to serve the area or an extremely adverse dentist-to-population ratio. A good portion of these communities have sufficient economic potential to support a dentist. The dental manpower survey will be the most important factor for evaluating this project.

The budget for the Bureau of Dental Health has decreased in the past 12 years from $125,000 to only $16,000. Through the efforts of Drs. Hardwicke, Frankel and Mehaffey, the next appropriation is expected to approximate $30,000, with substantial increases annually until funds are available to have the best dental health program.

LIAISON ACTIVITIES OF ASSOCIATION

The Missouri State Dental Association maintains a membership in the Missouri Health Council and four memberships in the Missouri Public Health Association. These four include the chairman of the council on dental health and the president, president-elect and secretary-treasurer of the association. Missouri dentists felt honored in having Dr. J. Paul Guidry, chairman of the St. Louis council on dental health, elected president of the Missouri Health Council for 1958-59.

CONCLUSION

It may be concluded that a state's dental association functions best when its council on dental health and other appropriate agencies serve as advisory groups to the state health department, the governor and the legislature. If the

association agencies act in such capacities, then great strides forward can be expected in the planning and implementing of the best possible dental health program.

The attainment of such a program as outlined here will be aided immeasurably through joint utilization of the new "State Dental Division Program Survey and Cost Estimate Form" by the state council on dental health and the state dental division.

COUNCIL ON DENTAL RESEARCH

Changes in American Dental Association Specification Number 15

Following are changes in American Dental Association Specification No. 15:

1. The title should read,

American Dental Association Specification No. 15 for Acrylic Resin Teeth.

2. Paragraph 1.1 should read,

1.1 Scope. This specification is for plastic teeth made essentially of acrylic resins and suitable for the construction of complete and partial artificial dentures by technics in general use at the present time by the dental profession.

3. Paragraph 3.1 should read,

3.1 Material. The teeth shall be composed of any of the following resins: (1) polymers of acrylic acid esters, (2) polymers of substituted acrylic acid esters or (3) copolymers or mixtures of any of the foregoing resins. The manufacturer shall furnish a certificate stating that the teeth are not toxic or irritating to the oral structures.

Cases and Comments

METASTATIC CARCINOMA OF THE MANDIBLE

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Metastasis to the jaw has been reported in instances of cancer of the lip, nasopharynx, bronchus, thyroid gland, breast, gastrointestinal tract, prostate gland and adrenal gland, as well as from other primary tumors, such as fibrosarcoma, lymphosarcoma, chondrosarcoma, melanoma and neuroblastoma.[1-6] The incidence of metastasis to the jaw bones is not known, probably because the jaws of patients with advanced cancer are seldom examined for metastatic growth and because autopsy studies rarely include careful examination of the mandible and maxilla.

Skillen[7] has reported an instance of carcinoma of the breast metastasizing to the jaw. There was no clinical evidence of the involvement, but histological studies at autopsy revealed extensive secondary lesions in both the maxilla and the mandible.

The instance which will be reported of metastatic carcinoma of the jaw from the lung is somewhat similar to that described by Skillen, in that there was no clinical or roentgenographic evidence of malignant tumor until biopsy showed the presence of cancer.

A 43 year old Negro woman was referred to the hospital. Her chief complaint was pain on the left side of the chest and a cough of four months' duration despite treatment by her physician.

Physical examination revealed a surgical scar on the abdomen due to a hysterectomy. There was thoracic dullness on percussion and diminished respiratory sound in the lower left part of the chest. A lipoma, which was considered to be of no significance, was noticed on the right shoulder. There was a mass in the left outer quadrant of the left breast, and there was a similar mass in the inner quadrant of the right breast.

The results of hematological studies were as follows: hemoglobin level 12.3 Gm. per hundred centimeters; white blood cell count, 11,750 per cubic millimeter; platelet count, 312,000 per cubic millimeter, and an hematocrit value of 35. The results of urine and stool examinations were negative. Roentgenography of the thorax revealed a pleural effusion on the left side, with several areas of parenchymal involvement on both the right and left sides. The results of a barium enema, an upper gastrointestinal series of tests, intravenous pyelograms, gynecological studies and bronchoscopic examinations were negative.

On the basis of the history and the clinical findings it was concluded that the patient had a bilateral metastatic malignant tumor of the lung with the breast as a probable primary site. The patient was hospitalized for further examination to determine specifically the primary site and for the administration of some palliative therapy with nitrogen mustard. All studies to determine the primary lesion were negative until a pleural biopsy showed squamous cell carcinoma to be primary in the lung (Fig. 1).

During this time the patient complained of pain in her jaw and was referred to the dental clinic where both lower central incisors and the lower left lateral incisor, cuspid and first bicuspid were extracted. Postoperative healing was uneventful.

The patient was discharged from the hospital with a return appointment with the medical clinic in one month. The patient returned to the hospital a week earlier than scheduled because of a cough and a dull pain in the left side of the chest. She had lost her appetite, and a resultant weight loss was apparent. She began to have cloudy vision in the right eye, and some pain in her right knee gave difficulty in walking.

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†Chief, head and neck service, University of Texas M. D. Anderson Hospital and Tumor Institute.

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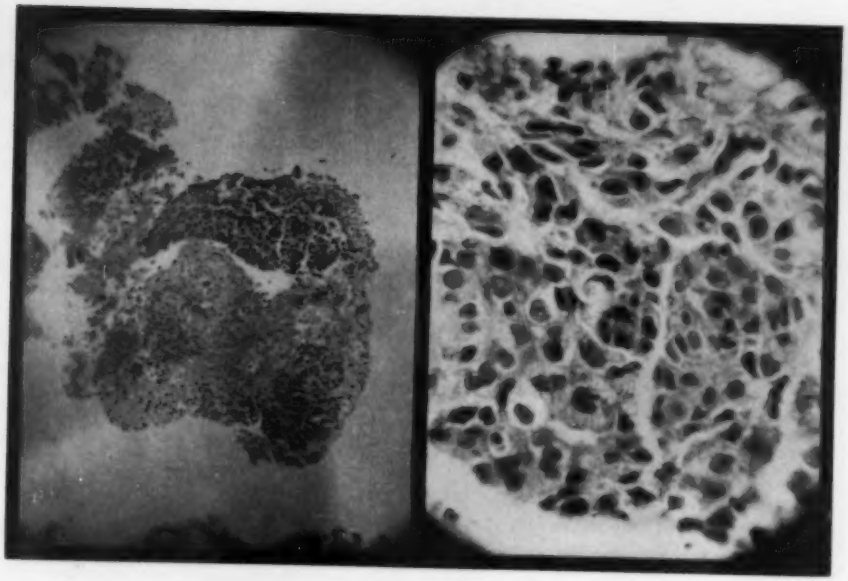

Fig. 1 • Biopsy specimen from lung showing squamous cell carcinoma

Fig. 2 • Smooth glistening mass on gum

Fig. 3 • Roentgenogram showing area where gum lesion developed and where lower right cuspid and first bicuspid had been extracted

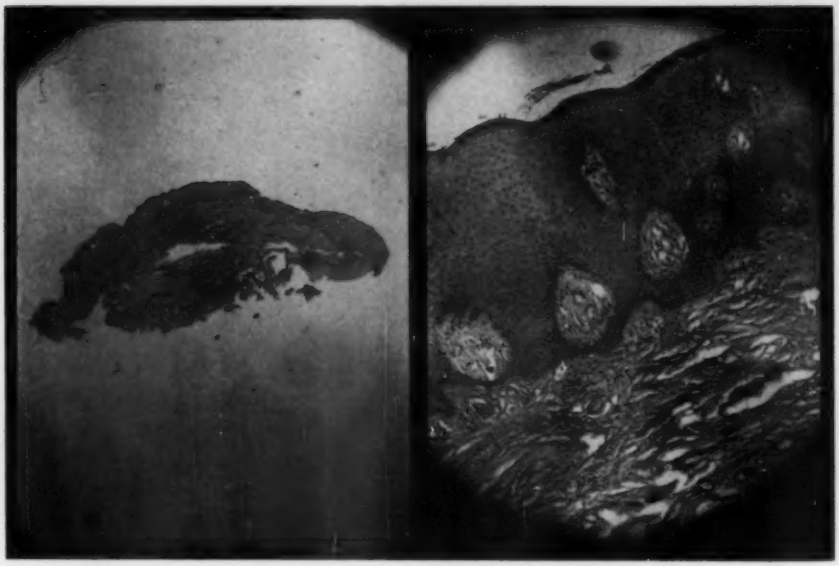

Fig. 4 • Biopsy specimen of gum lesion showing metastatic carcinoma in subepithelial connective tissue

The patient was again hospitalized for further nitrogen mustard therapy. Laboratory findings showed lowered hemoglobin level and red blood cell and platelet counts. Roentgenographic studies of the skull were negative, but examination of the right knee joint showed degenerative arthritic changes. Bilateral cerebral angiography gave normal results, but an electroencephalographic study showed the presence of a lesion in the left temporal and right frontal lobes. The patient was referred again to the dental clinic because of a smooth glistening mass that had developed on the gum in the region of the recently extracted teeth (Fig. 2). Roentgenographic (Fig. 3) and clinical examination of the region indicated the presence of some residual infection for which curettage was thought to be necessary. Curettage of the region was carried out, and a biopsy specimen was taken to rule out the presence of a tumor. The biopsy report indicated unclassified carcinoma in subepithelial connective tissue, suggestive of metastasizing primary lung carcinoma (Fig. 4).

SUMMARY

In the instance reported, metastatic carcinoma of the jaw in a 43 year old woman was found to be due to a primary lesion in the lung. Metastases to the jaw bone due to malignant tumor at a distant site may be expected with the same frequency as metastases to other bones of the body. The jaw bone should be thoroughly examined clinically, roentgenographically and histologically along with other bones. Examination of a biopsy specimen is very important in the establishment of the true diagnosis and prognosis as well as a correct treatment plan.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

RECIPROCITY AMONG STATES FOR DENTISTS' LICENSURE

As a dentist who deplores the lack of reciprocity among the states of this country in regard to dental examination and licensure, I make this plea to the American Dental Association: As the only full and recognized organization of American dentists, please help the individual dentist end a discouraging and pitiful situation which he cannot solve alone.

In the early 1900's, when most state dental practice acts were legislated, dentistry as an organized profession was young and not self-governing. In those days of proprietary dental schools unregulated by state charters, of "diploma mills" and of correspondence dental schools, dental quacks moved on to other areas after their bad records had caught up with them. Communications were poor, and their bad reputations did not follow them.

To protect the public, state board examinations were provided, and, as all states gradually adopted them, the dental quack died out. Dentistry grew, governing itself better through a strong American Dental Association and through effective local dental societies. More importantly, dental education improved, and degrees were awarded only to those who earned them. All U. S. dental schools were eventually rated class A by a council or were working on such a program. [From 1918 to 1936, the Dental Educational Council of America rated approved dental schools class A, B or C according to the excellence of their programs. After 1938, the schools were considered for approval by the Council on Dental Education of the American Dental Association.]

However, when a respectable, ethical dentist of today wishes to move his practice to another state for any honest reason— including health —he cannot answer the state board "theory" questions, which he properly answered his first two years in dental school, because he does not use this basic information in his practice every day. Nor can he do certain parts of the "practical" examination which he did capably many times at school but which involves the use of a filling material he no longer chooses to use or involves a job he, like most busy dentists, lets a laboratory perform.

Neither of these failures, however, keeps him from handling adequately any dental situation which may arise in his office.

The A.D.A. being the nearest thing to a union that dentists in the United States have, the dentist, an educated professional man with years of unblemished public service, looks to it for leadership and aid as a tradesman looks to his union. It is highly respected by its members, by government regulatory officials and by laymen. Couldn't the A.D.A. offer some program whereby the practicing dentist could be granted a license in another state, by reciprocity, if his dental school was rated class A at the time of his graduation and if his local dental society could unqualifiedly recommend his moral character and professional conduct? Such judgment would be truer recommendations of his ability than a state examination. At our national conventions, dentists of all states exchange scientific and clinical information, and a president is chosen to direct our Association's policies and actions, which will be acceptable in all states. In this atmosphere of professional brotherhood and equality, would it not be appropriate for the A.D.A. to approve and aggressively strive for reciprocity between all states?

A plumber, carpenter, merchant or common laborer can move, but a dentist cannot. He is good enough to treat the people of one state but not of another. He satisfied for four years the close examination of his professors, who were highly qualified to judge his abilities, but he cannot satisfy the temporary scrutiny of dentists appointed by a governor to superficially examine him. His past actions and qualifications, his integrity through the years in his community, are all for naught.

I look to the American Dental Association for leadership in this cause. It is our only effective, ethical representative. Let it not be apathetic to this plea. If the readers of this

letter feel the same as I, would they please write to THE JOURNAL so that their feelings may be known and action may be begun on this cause.

Name withheld by request

Editor's Comment • Ten of the 52 boards of dental examiners have reciprocal agreements in actual operation. An additional 22 states have provision for reciprocity in their dental practice acts, even though no actual agreements are in effect.

The American Dental Association sponsors and operates the National Board examinations which cover the basic sciences related to dentistry and the theory of dental practice. Thirty-three boards of dental examiners accept the certificate of the National Board of Dental Examiners in lieu of the theory portion of the dental licensure examination.

THE DENTIST'S RESPONSIBILITY

In a tribute to Dr. William J. Gies, who died in May 1956, Theodor Rosebury in an issue of *Science* (126:1056 Nov. 22, 1957) evaluates Gies' *Bulletin Number 19* and how far we have gone in dental education toward improvement and how far we are short of the goal.

Before I give some of the thoughts that occurred to me when I read Dr. Rosebury's article, let me give my background.

I had made up my mind when I first entered high school that I wanted to be a dentist, and everything I could do to attain that goal I did to the best of my ability. I felt that a dentist needed digital dexterity to execute his delicate work on the teeth and also that it was necessary to keep that skill developed to as fine a degree as possible. It was therefore my resolve to learn as much as possible about all of the materials used in dentistry and to learn to manipulate them as well as possible.

It became obvious to me that sending all laboratory work out to a technician was not going to satisfy these requirements and so I did much of the laboratory work myself, and I still do as much as I can with the equipment I can accommodate and the time I can reasonably devote to it. It is true that this eliminates many evenings each week that otherwise would be spent in watching TV, playing bridge or maybe getting into trouble in ways that are well known to social butterflies, but that was the only way I could keep that still, small but persistent voice of conscience both still and small. Otherwise the sound would get so loud and rumble so strongly in my ears that even Wagner's "Valkyrie" would be drowned out. I did not neglect listening to music, nor did I fail to read the monthly issues of several dental journals or lose contact with the world of literature or science.

Dr. Rosebury entitles his tribute "The Challenge to Dentistry." He says that some of Dr. Gies' recommendations for dental education have been realized. He speaks of the great strides in dental research and mentions fluoridation as an advance. He says nothing about the greatest and most important findings in his own field of bacteriology as the result of experiments with germ-free rats which showed the relation between caries production and various types of bacteria. These experiments were reported in THE JOURNAL (50:259 March 1955) and elsewhere. He says too little about the immoral and unethical practitioners with which our profession is plagued.

We need more changes in our dental education programs. Rosebury is right about this, but we do not need just more research. We need to apply the knowledge we already have first. We must spread the knowledge we have acquired, particularly what we know now of the chemicoparasitic theory originated by W. D. Miller and confirmed by the definitive experiments mentioned previously.

We must do everything in our power to point out the terribly immoral advertising of the cereal, the cake, candy and dessert people and the chewing gum hucksters who do not hesitate to advocate and promote harmful habits of eating and snacking to the detriment of the dental and general health of our young generation.

We must educate our dental teachers so that they will imbue their students with a love and respect for the work they are undertaking and so that they will not minimize the mechanical phase of our work. The scientific background is fundamental. No operator can work with intelligence if he does not understand the basic procedures, all of which have a scientific basis, but we are all clinicians. There can be no successful clinical practice without a maximum attention to mechanical manipulation.

Our dental teachers must be able to impart a higher moral sense to their students. They must teach the student to have the courage to face patients and point out their improper attention to tooth and gum brushing and their improper nutritional habits and to point out that many of the blandishments of the gray flannel crowd are nothing but deceitful hucksterisms.

The lame excuses of dentists should not be forgotten. We must destroy the myth of "soft teeth" and fillings that do not last because of "secondary decay." Let us not forget the perio-

dontists. They are acquiring a vocabulary of double-talk that can only find its equal on Madison Avenue. Let us teach ourselves to say to a patient, "*Mea culpa*—I am to blame." "It is my fault that you have these miserable fillings in your teeth." "It is my fault that your partial denture is ruining the supporting teeth." "It is my fault that your children are losing their deciduous teeth because I didn't teach you how to feed them properly!"

Yes, Dr. Rosebury is right. We do need to pay tribute to Dr. Gies, but Dr. Rosebury is too meek. Dr. Rosebury does not do justice to Dr. Gies, to his own position and to the memories of the great men who preceded him to urge him on. He should have sent off an H-bomb instead of a little firecracker. I honor the memory of Dr. Gies, and I respect Dr. Rosebury. I hope God will give us the courage to go forth to our daily work inspired by such men as these to add greater glory to our profession.

William Gunter, Middletown, Conn.

CARIES AND TOTAL HEALTH

It was with great interest that I read Dr. Basil G. Bibby's letter in the June 1958 JOURNAL, in which he expressed approval of your editorial, "The Caries in the Candy Box," in the April issue, and then continued by saying that the A.D.A. literature should begin reflecting the fact that the cariogenic activity of sweetened beverages is much less than that of sticky candies. Doctor Bibby closes by saying that we should promote fuller discussion of this problem. I heartily agree with this last statement, and this letter is being written in that spirit.

Other scientists have expressed sentiments similar to those of Doctor Bibby regarding the relative cariogenicity of soft drinks, and these statements have been widely publicized and distributed to elementary teachers and other lay people by the soft drink industry.

These statements by some of our most eminent scientists serve to highlight one of our gravest problems: the failure to relate properly, isolated experimental findings to the total nutritional picture. Stated positively, the problem could be said to be: How can scientific findings, obtained under highly controlled and objective conditions, be most helpfully utilized in the day to day job of treating not Mr. Average Citizen but an infinite variety of human beings, each with individual problems and requirements, who live in a world where most nutritional education is obtained from mass media daily announcing such significant nutritional nuggets as "Any time is the right time for right-tasting Coca Cola," or "No other food satisfies appetite so fast with so few calories (as sugar)"?

For practical application to individual people, I believe our scientific findings would be more useful if restated and fitted into the total nutritional picture, perhaps in the following manner:

1. The most widely quoted clinical research on caries in recent years has been the Vipeholm study. Much has been made of the fact that this study clearly showed that sugar in sticky form was much more cariogenic than sugar in solution.

Strangely enough, the most important findings of all in this tremendous piece of research —that by restricting the intake of sugar in all forms, the caries incidence was reduced to practically nothing in the experimental subjects—is hardly mentioned in most discussions in our literature of this monumental study.

For a country whose citizens have one of the highest incidences of caries the world has ever seen and which is spending thousands, if not millions, in looking for caries preventatives, it would seem that this finding would be of more than casual interest! There must not have been too much objection to this diet from the nutritionists (with whose reaction Doctor Bibby was concerned) since the subjects remained on it for two years.

2. Although soft drinks are not as cariogenic as sticky candy, they will drop the pH of the bacterial plaque to an enamel-dissolving level in many mouths.

This is like saying that beer will not make one as drunk as bourbon. The basic fact to remember is that just as beer is intoxicating, soft drinks are essentially nonnutritive (except for caloric value), caries-producing liquids.

3. Children in real life consume not candy OR soft drinks, but candy AND soft drinks, and (we hope) important nutrient-containing foods such as fruit and fruit juice. It is logical to assume that the consumption of any one group of these sugar-containing substances could be established at a level, both in quantity and frequency, which would not be cariogenic. However, in making recommendations for people in everyday life, the total sugar consumption from all three sources has to be evaluated. It is quite likely that the addition of the soft drinks to a borderline diet would be the factor that pushes the patient into the caries active zone.

4. This brings us to what is perhaps the most important aspect of this problem. As members of the health team we are obligated to consider the total health picture.

It is a well established fact that the consumption of excessive amounts of "empty calorie" substances (such as carbohydrate foods from which virtually all vitamins and minerals have been removed) is one of the most serious nutritional menaces that civilized countries face. Therefore, when we make dietary recommendations as individual dentists or as an association, it should be in terms of their impact on the total individual, not just in respect to dental caries or periodontal disease.

Thus, in discussing the health aspects of soft drink consumption, for instance, with lay groups, it should never be in terms of their relative cariogenic properties alone. Other problems should be mentioned simultaneously, such as their watering-down effect on the diet; the caffeine addicting potentialities of the colas; the presence of possible carcinogenic substances, in the form of food coloring, in some soft drinks, and the possible effects of the phosphoric acid content.

Unfortunately, evidence such as that presented in Vance Packard's best seller, *The Hidden Persuaders*, indicates that commercial interests, when faced with the choice of increasing profits or disseminating objective educational information, are still more likely to choose the former than the latter.

The dental profession is one of the few sources of information on nutritional problems not dominated by these commercial interests. Since the citizens of this country have granted the dental profession the exclusive right and privilege of caring for their dental health needs, it behooves us to reciprocate by seeing to it that they get the truth and the whole truth regarding the nutritional aspects of dental health, objectively interpreted in terms of its impact on them as individuals, and not isolated facts given without reference to the real-life situations in which they will be used.

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Three more studies on the effects of prolonged ingestion of fluoride

Proof that the fluoridation of drinking water by one part per million is noninjurious to health continues to mount. Findings of three studies[1–3] published in the August issue of *Public Health Reports* add to the cumulating evidence that even where considerably larger amounts of fluoride are present, there is no harm to the body.

Ever since Morichini in 1805 found fluorine in human enamel, and Berzelius in 1807 in human bones, scientists in many countries have investigated the beneficial and detrimental effects of this trace element in man. The American Dental Association withheld its approval of fluoridation until 1950, when the evidence for its safety in man at the proposed levels was overwhelming.

Public health programs to prevent dental caries by the fluoridation of drinking water always have considered the possibility of cumulative toxic effects. The extensive necropsy studies on persons who had been lifetime residents of communities in Colorado and Texas where the level of fluorine in the water has been 2.5, 2.8, 4.0, and 8.0 ppm have been of particular interest.

The three most recent studies referred to were conducted by the National Institute of Dental Research to determine whether pathologic changes could be correlated with prolonged ingestion of fluoride-bearing water.

Geever and others made microscopic examinations of bones from 37 skeletons of persons who had resided for ten years or more in communities where the drinking water contained from 1 to 4 ppm fluoride. Bone specimens from 33 persons who had lived in areas where the drinking water contained less than 0.5 ppm fluoride were used for comparison. The microscopic examinations showed no significant difference between the fluoride-exposed group and the control group that could be related to fluoride intake.

Zipkin and others analyzed essentially the same bones for ash and fluoride, in a study that represents the first systematic survey of the fluoride concentration in bones of individuals exposed to various concentrations of fluoride in drinking water. They

found substantial evidence that a concentration of fluoride as high as 0.548 per cent in the dry, fat-free bones and 1.080 per cent in the bone ash may be present without producing any apparent tissue damage.

McClure and others analyzed chemically the bones of two elderly women. One had resided for decades in Bartlett, Texas, where the drinking water contained 8.0 ppm fluoride, the other in Washington, D.C., where the drinking water contained 0.2 ppm fluoride. Although the bones of the subject from Bartlett contained as much as 0.5 to 0.6 per cent fluoride (about ten times the quantity of fluoride regarded as normal), roentgenographic, medical and clinical studies made prior to death did not reveal any skeletal abnormalities or systemic conditions of consequence to health or well-being which could be associated directly with the remarkable increases in the skeletal fluoride content. The authors conclude that human skeletal tissue may have a high degree of physiologic tolerance to accumulations of fluoride. The three studies herewith reported should quiet the fears of the timid and still the voices of opposition.

1. Geever, E. F., and others. Pathological studies in man after prolonged ingestion of fluoride in drinking water. Pub. Health Rep. 73:721 Aug. 1958.

2. Zipkin, I., and others. Fluoride deposition in human bones after prolonged ingestion of fluoride in drinking water. Pub. Health Rep. 73:732 Aug. 1958.

3. McClure, F. J.; McCann, H. G., and Leone, N. C. Excessive fluoride in water and bone chemistry: comparison of two cases. Pub. Health Rep. 73:741 Aug. 1958.

The dental society and the National Science Fair movement

This is the time of the year when the country's Science Fair programs begin to unfold in the grass roots areas. Ideas conceived now and later transformed into visible form will culminate next spring in hundreds of scientific exhibits presented by hundreds of high school students at the National Science Fair.

This is the time of the year, therefore, when dental societies should renew their connections with their community school authorities in an effort to assist science teachers and scientifically inclined pupils in the preparation of outstanding scientific exhibits.

The Science Fair movement, since its inception eight years ago, has grown to be one of the most popular programs of American youth. Additionally, it has caught the imagination of American adults. From coast to coast businessmen's clubs, health professions, industrial organizations and educational associations, among others, are backing their local high school efforts in the Science Fair program, hoping primarily to stimulate more young men and women to enter some type of scientific occupation and secondarily to help bring recognition to their local youth and prestige to their community. There are now some 17,000 affiliated Science Fair clubs in America boasting a third of a million membership.

The House of Delegates in 1957 endorsed the Science Fair movement and urged constituent and component societies to become active in their local programs. Several alert societies did so with the result that a number of students in a number

of communities, aided by their local dental society or by their family dentist, constructed exhibits on dental subjects. One was of sufficient worth to reach the finals at the National Science Fair held in Flint, Michigan, last spring.

Active participation in the Science Fair movement will enable dentistry to broaden young America's understanding of all aspects of health. Additionally, it should stimulate more of the better qualified students to adopt dentistry as a career. Furthermore, public relations benefits are derived from participation in the program, as has been pointed out by one Indiana County Medical Society president:[1]

"The Science Fair is the best public relations prospect we have had in the past 25 years. The science fair program is strictly American, an entirely voluntary effort to allow boys and girls throughout the land to develop themselves to the limit insofar as they desire. It is also a fine anti-delinquency program . . . its component parts reach down to a grass roots organization providing boys and girls with the best opportunities to be found anywhere in the world."

There are many things which a dental society can do to identify itself with this great new national youth movement. It can establish liaison with the local Science Fair organization; support the program financially; suggest exhibits on worthwhile dental scientific subjects; provide guidance to the youthful participant, and furnish awards to the winning contestants. Write for detailed information about the operation of Science Fairs to: Science Clubs of America, Science Service, 1719 N Street, N.W., Washington 6, D. C.

To what worthier cause can dentistry devote its extraprofessional interest? And what more logical time than this fall to initiate that interest?

1. Eades, Ralph. A.M.A. Science Fairs Public Relations Institute, Aug. 29, 1956.

The Royal Dental Hospital of London School of Dental Surgery observes its centennial

The opening, June 3, of a modern effectual addition to the Royal Dental Hospital of London School of Dental Surgery must not be permitted to pass unheralded by the dental world. The inaugural ceremonies were a memorial event in a series of anniversary commemorations[1] of special import not only to British dental educators but to others elsewhere who, during the past century, have struggled to raise the level of dental education.

The Royal Dental Hospital of London was inaugurated on December 1, 1858. Ten months later, there was established within its walls the London School of Dental Surgery, the first dental school with full facilities for practical instruction to be established in Great Britain and one of the pioneer institutions of its kind in the world. Both hospital and school owe their being to that remarkable organization, the Odontological Society of London, which was established only two years earlier—in November 1856.

Few organizations in any profession have achieved so much or influenced their vocation so profoundly as the Odontological Society of London. In addition to

planning and launching the new dental hospital and dental school, it defined standards of education, training and ethics and was responsible for the insertion of a clause in the British Medical Act of 1858 granting the Royal College of Surgeons "power to institute and hold examinations for the purpose of testing the fitness of persons to practice as dentists . . . and to grant certificates of such fitness."[2]

The dental profession in Great Britain and elsewhere will forever be indebted to the small, select band of reformers dubbed "Memorialists" who activated the Odontological Society and initiated the much needed reforms in British dental practice—reforms which have made themselves felt around the world.

American dentistry congratulates British dentistry on the opening of the new addition to the Royal Dental Hospital of London School of Dental Surgery and extends felicitations to the Royal Dental Hospital on its centennial. Additionally, American dentists would like to take advantage of this occasion to join with their British colleagues in paying respects to that sturdy group of Memorialists which numbered within its ranks Sir John Tomes, Sir Edwin Saunders and the two Samuel Cartwrights—leaders who labored so well for dentistry and the public interest a century ago.

1. Royal Dental Hospital and School. Brit. M.J. No. 5083:1351 June 7, 1958.
2. Henry, C. Bowdler. The homes of the Odontological Society and their associations (1856-1900). Proc. Roy. Soc. Med. 48:977 Nov. 1955.

International Correspondence

NEWS FROM GREAT BRITAIN

On July 5, 1948, Britain embarked on the greatest social experiment in her history, a National Health Service. It was estimated that a "free" health service would cost £170,000,000 a year, whereas the first year's bill amounted to £360,000,000. Now, ten years after the introduction of the service, the bill has soared to £740,000,000.

Put into homely terms the cost to each family this year will be close to £50 compared with £26 the first year. The great bulk of the costs of the service (approximately £500,000,000) is met out of the National Exchequer; that part of the weekly insurance stamps reserved for the Health Service provides only one-seventh of the cost, and the rest comes from indirect taxation on such items as tobacco, beer, spirits and direct taxation in the form of income tax, and so forth.

If there were no health service, the effect would be tremendous . . . income tax could be reduced by three shillings in the pound, reducing the standard rate to 5/6d, or it could mean the abolition of the purchase tax, reducing the retail prices of beer, spirits and tobacco by one-half.

There is no suggestion that the Health Service should be abolished, but it is generally felt that the present system could be modified to provide a better service at a lower cost to the nation.

What is the evidence for this? Undoubtedly dentists and physicians see money wasted in excessive control, and too much bureaucracy and paper work. Many are convinced that standards of practice are falling. There is also the interesting fact that, although nobody can escape paying for the Health Service, there are in Britain about 2,000,000 people who pay extra to avoid having to avail themselves of it. They pay regular subscriptions to voluntary associations, such as the British United Providential Association, to ensure that in the event of serious illness or accident they will be treated outside the National Health Service.

It has been suggested that the nation can afford a free health service only for the genuinely needy and for children, and that for the rest charges must be made. The choice is either to pay ever-increasing amounts through taxation, or to keep the bill down to a reasonable level by paying more when the service is used.

Reform must be made which will make a better Health Service and by making those who use it realize its cost and its weaknesses, and thus eliminate the waste and extravagance and lowering of standards which now goes on.

So far as the General Dental Service is concerned, it is hard to foresee future developments. We have a profession almost static in membership, and a demand for treatment which shows no signs of decrease from the present level. The obvious solution is more dentists. This can be brought about only by building more schools, and this is a long term policy. There are advocates of the policy of delegating some part of the dentists' work to ancillary workers, as provided in the Dentists Act, 1956, and this may well come about, for members of the dental profession are certainly not making sufficient use of ancillary help.

There are two other ways of relieving the situation: dental health education of the public so that people may help themselves in the practice of home preventive treatment and learn to see the dentist regularly and early enough, and an extensive fluoridation of our domestic water supplies, which would decrease the incidence of dental decay in our child population.

If the rate of costs increases in the next ten years as it has in the first ten, then the cost to the nation will be in the region of £1,400,000,000 and that great social experiment, a National Health Service, will have brought Britain to a state of penury.

BRITISH DENTAL ASSOCIATION

Dental Research • The long-awaited "Memorandum on Dental Research in the United Kingdom" is worthy of careful study. It has been prepared by the Dental Research Sub-Committee of the Dental Health Committee of the Association and is based mainly on the results of a questionnaire and circular letter sent to the dental schools and other organizations. It is true that some of the shortcomings inherent in this type of investigation are immediately apparent. Thus, in February and

March 1956, according to the replies, there were almost 300 research projects of various kinds in progress in the dental schools. Judging from the number of research publications from workers in British dental schools which have appeared since that date, many of these projects have been unrewarding or are of exceptionally long term. The number of major research projects in our dental schools and other institutions must indeed be much less than this, and would not appear to compare favorably with the amount of dental research being done in some other countries.

However, as a result of this investigation the main reasons for this limited output of dental research have been ascertained, and a number of recommendations are made which, if implemented, should produce a substantial increase in research.

DENTISTS REGISTER 1958

In a memoir of *The Dentists Register 1958*, published by the General Dental Council, Bryan Wood writes:

"The latest edition of *The Dentists Register* is noteworthy in that the special legislation governing the dental profession, instead of being spread over from separate Acts, is contained in one, the Dentists Act, 1957. The Acts of 1921 and 1923 have disappeared from the Statute Book; the last entry of a dentist registered by virtue of those Acts being in 1952. Thirty-seven years after the passing of the 1921 Act, the number of dentists registered under its provision had dropped to just under 15 per-cent of the total.

"The total number of dentists on the Register has risen to 16,113, an increase of 106 on that recorded in the 1957 Register. Any feeling of satisfaction with this addition to the numbers of the profession must be tempered by the knowledge that practically the whole of this increase is attributable to increases in the number registered in the Commonwealth and Foreign lists, 86 in the former and 16 in the latter. A further cause for misgiving with regard to recruitment is that during 1957, the names of only 475 dentists from schools in the home countries were added to the Register, this being the lowest total recorded since 1950, and only 78 per cent of that for 1952.

"New registrations in the Commonwealth list in 1957 totaled 152, almost one-third of the figure for the British Isles. It has, of course, to be borne in mind that probably a considerable proportion of those so registered do not constitute permanent addition to the Register. It is, however, worthy of note that the number of dentists registered in this section has increased steadily in recent years, being now 50 per cent higher than in 1956. The great majority, approximately 75 per cent, of these Commonwealth dentists are graduates of Australian universities, no less than 200 of them coming from Sydney University."

LORD WEBB-JOHNSON DIES

Of Lord Webb-Johnson, who died on May 28, 1958, Sir Wilfred Fish writes, "We have lost the companionship of the great man who, as President of the Royal College of Surgeons, achieved more towards integrating dental surgery with the daily life of the College than did any other in the hundred years' association of our profession with that institution.

"Standing close under a great masterpiece, whether of architecture, sculpture or painting, it is difficult to appreciate the full grandeur of the artist's conception. This is equally true when his contemporaries try to assess the significance of the achievement of a great master in any other walk of life. What is already clear beyond dispute is that posterity will place Lord Webb-Johnson amongst the great names of all time in British surgery.

"There can be few who do not know the story of how he became president within a few weeks of the partial destruction of the College by enemy action in 1941, and of how he set about the purchase of the ruined property all round so that there might arise—as there has arisen—a greater college, better equipped for research and post-graduate study, more suitable as a repository for the famous Hunterian Museum and for the College Library, and more appropriate as the home of British surgery than the old building could ever have been.

"It was Lord Webb-Johnson, of course, whose administrative skill and pertinacity established the Faculties in the College and opened the door to a dental Fellowship of significant value in our professional work.

"He fought a good fight and he has finished his course; he kept his faith. He won the deep affection of his many friends."

ITEMS OF INTEREST

H. Parker Buchanan's countless friends in the Association and abroad will learn with great regret that he has found it necessary to tender his resignation. He has held the position of secretary for ten strenuous years and has never spared himself on behalf of the profession. His easy, friendly disposition and social acumen have been of great benefit in many

ways. His countless friends will wish to express their best wishes for his success and happiness in the future.

We offer our sincere congratulations to Professor Boyes, who at present holds the chair of oral surgery in the University of Durham and who has been appointed to succeed Professor A. C. W. Hutchinson in the chair of dental surgery at Edinburgh. Professor Boyes was educated in Edinburgh at George Watson's College, the School of Medicine of the Royal College, and the Dental Hospital and School. He took his dental qualification in 1934 and his medical qualification the following year. He has had a wide experience in hospital work and took the F.R.C.S.E. in 1945.

The results of the ballot for the election of four Fellows in Dental Surgery to the Board of Faculty of Dental Surgery of the Royal College of Surgeons of England were as follows: Professor A. B. MacGregor and G. H. Leatherman were re-elected, and G. T. Hankey and N. L. Rowe were elected.

The British Dental Association welcomed a new honorary member on Friday, June 13, when Viscount Nuffield, C.H., G.B.E., was guest of honor at a complimentary dinner at the Royal College of Surgeons, London.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

NEWS FROM AUSTRALIA

For the second time in five years the World Health Organization will convene a dental health seminar in the Western Pacific Region. The meeting is scheduled to take place in Adelaide, South Australia, February 10-20, 1959, prior to the 15th Australian Dental Congress which will be held February 23-27. The seminar group will attend the congress officially.

This international dental conference, which was initiated by the Australian Dental Association, first was proposed to the regional committee of WHO by Australia. The seminar is to be conducted as an inter-country project of the WHO Western Pacific Regional Office in cooperation with the Department of Health of Australia.

The objectives of the seminar as stated in the invitation to governments are as follows:

1. To review accomplishments in dental health in the Western Pacific and Southeast Asia countries during the past five years (since the previous seminar in New Zealand in 1954), especially in the field of preventive dentistry.

2. To identify and discuss current dental health problems in the Western Pacific and Southeast Asia countries, and the roles of the national health administration and the dental profession in the solution of these problems.

3. To discuss standardization of reporting dental health disease.

Attendance at the seminar is strictly by invitation. At least 45 participants from approximately 25 countries and territories are expected to be present. Of this number, seven will be from countries in the Southeast Asia and Eastern Mediterranean Regions of WHO and ten from Australia. Because of the importance of the discussions which will take place, at least five international health agencies have been invited to send observers.

The staff will be composed of the seminar director, the consultants and Dr. S. Falkland, Regional Public Health Administrator for the Western Pacific Regional Office, who will be in charge of the operations of the seminar. It will be responsible for the operation of the seminar which will include plenary sessions as well as group discussions.

The director of the seminar, G. S. McDonald of Adelaide, was formerly Deputy Director of Education in South Australia and has had a wide international experience. Those invited as the consultants include the following: Donald J. Galagan, assistant chief, Division of Dental Public Health, U. S. Public Health Service, Washington, D. C.; Professor Jens Waerhaug, head of the department of periodontia and crown and bridge, the Norwegian State Dental School, Oslo, Norway; Professor John Walsh, dean of the Faculty of Dentistry, University of Otago Dental School, Dunedin, New Zealand, and Professor T. D. Campbell, dean of the Faculty of Dentistry, University of Adelaide, Adelaide, Australia. Dr. Galagan and Professor Waerhaug will be serving as consultants provided by WHO. Professor Walsh will be the consultant provided by the Australian Dental Association, and Professor Campbell will act as honorary consultant.

Working papers on subjects of special interest will be prepared in advance by the consultants and some of the participants, and each participating country is being requested to submit a report on the recent developments in dental health. The purpose of the seminar is to gather information which will assist participants in solving their national dental problems. It will be an opportunity for them to receive the latest information in the field of preventive dentistry and dental public health as well as to exchange experiences with colleagues from other countries.

Margaret Hjorth

BOARD OF TRUSTEES HOLDS BUSY SEPTEMBER MEETING, PREPARES REPORTS FOR ANNUAL SESSION AND REVIEWS ASSOCIATION AFFAIRS

The American Dental Association trustees and officers met September 15-17 at the Central Office to tackle a crowded agenda of old and new business. Four reports were prepared for presentation at the 99th annual session of the House of Delegates in November at Dallas. One more will be prepared prior to the Dallas meeting.

Report 1 deals with Association affairs and includes the nominations to councils made by the Board. Report 2 provides the comment of the Board of Trustees on the reports and resolutions presented by the councils, the constituent societies and other agencies. Report 3 is a special report on the Association's present and future financial status and presents a proposal to increase dues by action of the House of Delegates at the 1959 session. Report 4 is a special report for the proposal for the development of a women's auxiliary to the Association.

ATTENDANCE

Trustees in attendance at the meeting were: Edward F. Mimmack, second district; Fritz A. Pierson, eleventh district; John S. Eilar, twelfth district; John R. Abel, thirteenth district; Howard B. Higgins, fifth district; Paul H. Jeserich, ninth district; Charles H. Patton, third district; Robert J. Wells, eighth district; Edward R. White, fourth district; Arthur W. Easton, first district; Earl G. Jones, seventh district; A. F. Schopper, sixth district, and Lewis W. Thom, tenth district.

BUDGET AND CENTENNIAL

The budget and appropriations for 1959 were discussed at the meeting, and the announcement was made that total membership in the association passed the ninety thousand mark some time prior to August 31. The figure now stands at 90,940 as compared to 89,345 for 1957.

There was lengthy discussion of the plans for celebrating the A.D.A's centennial year in 1959, and a detailed plan was submitted by the Special Committee on Centennial of the Board of Trustees.

OTHER ACTION

In additional actions, the Board authorized a change in the name of the JOURNAL OF ORAL SURGERY in order to expand its usefulness to members and to provide better coverage of two important areas of dentistry. The new name of the publication will be the JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE. The first issue under the new masthead will appear in January 1959.

The Board also approved a resolution to increase the subscription price of DENTAL ABSTRACTS beginning January 1, 1959. The fee will go from $6 to $8 for domestic subscriptions and from $7 to $9 for foreign ones.

MIAMI BEACH CHOSEN

The Board approved the choice of Miami Beach as the site of the 1962 annual ses-

sion, the dates of which will be October 29 to November 1, and Atlantic City for the 1963 session which will be held on October 14-17.

As a result of a conference with representatives of the Council on Dental Education and the American Academy of Crown and Bridge Prosthodontics, the Board will request that the House of Delegates re-instate the moratorium on the development of new specialty boards for a period of one year ending with the 1959 annual session.

HOSPITAL DENTAL SERVICE

The Board authorized the Council on Hospital Dental Service to initiate a series of regional conferences on hospital dentistry and to inspect prospective dental services in all areas of constituent societies and military service hospitals.

INSURANCE

Approval was granted to a resolution that the Association provide a minimum basic coverage of $25,000 for accidental death and dismemberment insurance for the officers, trustees, council members and designated staff while traveling on Association business.

PRESIDENT ALSTADT

Association President William R. Alstadt reported to the Board that he had accepted 61 of the 109 formal invitations he had received to appear or speak, or both, at numerous functions, in addition to many informal ones.

HISTORY

The first rough draft of the History of the American Dental Association has been completed and the Trustees were advised that the work of editing and revising is under way. It will be published early in 1959.

CONSULTANTS

In additional actions, the Board appointed consultants to the various Association Councils for terms ending with the 1959 session. These appointed to the Council on Dental Health were:

(Miss) Pearl Bierman, Chicago; (Mr.) John W. Castellucci, Chicago; Herbert K. Cooper, Lancaster, Pa.; Kenneth A. Easlick, Ann Arbor, Mich.; (Mr.) J. F. Follmann, Jr., New York City; Maurice J. Friedman, Little Rock, Ark.; Donald J. Galagan, Washington, D. C.; Irving R. Hardy, Boston, Mass.; Robert G. Kesel, Chicago; Harry M. Klenda, Wichita, Kan.; Maury Massler, Chicago; (Mr.) W. E. Taylor, Washington, D. C.; and (Mr.) E. Todd Wheeler, Chicago.

Named as consultants to the Council on Federal Dental Services were:

Russell W. Bunting, Ann Arbor, Mich.; John G. Carr, Camden, N. J.; John E. Chrietzberg, Atlanta, Ga.; Thomas P. Fox, Philadelphia; James P. Hollers, San Antonio, Texas; Harold W. Oppice, Chicago, and Phelps J. Murphey, Dallas, Texas.

The Board approved the following as consultants to the Council on Dental Education:

Philip E. Blackerby, Jr., Battle Creek, Mich.; Leroy R. Boling, St. Louis; O. M. Dresen, Milwaukee; Don W. Gullett, Toronto, Canada; (Miss) Evelyn R. Hannon, Portland, Ore.; Raymond J. Nagle, New York City; Clarence M. Peebles, Chicago; (Mr.) Paul A. Slone, Washington, D. C.; Ray V. Smith, Iowa City, Iowa; (Miss) Margaret Swanson, Chicago, and George W. Teuscher, Chicago.

Consultants appointed for the Council on Dental Research were:

Wallace D. Armstrong, M.D., Minneapolis; Herbert D. Ayers, Flushing, N. Y.; Harold C. Hodge, Rochester, N. Y.; Seymour J. Kreshover, Bethesda, Md.; Robert J. Nelsen, Rockville, Md.; (Mr.) Ralph W. Phillips, Indianapolis; (Mr.) Albert G. Richards, Ann Arbor, Mich.; Reidar F. Sognnaes, Boston; (Mr.) Kenneth H. Strader, Toledo, Ohio, and Wendell L. Wylie, San Francisco.

Approved as consultants for the Council on Dental Therapeutics were:

N. W. Chilton, Trenton, N. J.; (Miss) Mary C. Crowley, Ann Arbor, Mich.; Edward J.

Driscoll, Bethesda, Md.; Harrison Flippin, Philadelphia; Count Gibson, Jr., Boston; (Mr.) Stanley C. Harris, Chicago; James R. Hayward, Ann Arbor, Mich.; (Mr.) Walter Hess, Washington, D. C.; Niels B. Jorgensen, Loma Linda, Calif.; Daniel W. Mitziga, Chicago; Leonard M. Monheim, Pittsburgh; Max Sadove, M.D., Chicago, and Ned B. Williams, Philadelphia.

Paul W. Zillmann, Buffalo, was appointed consultant to the Council on Insurance.

Approval was given by the Board to the following list of consultant appointees to the Council of National Board of Dental Examiners:

Edgar D. Coolidge, Evanston, Ill.; Harry Clawson, New Orleans; Alton K. Fisher, Iowa City, Iowa; Benjamin F. Gurney, Chicago; William B. Martin, Denver; Norman A. Moore, Kansas City, Mo.; Marcus D. Murphey, Houston, Texas; Harold J. Noyes, Portland, Ore.; Arthur P. O'Mara, Chicago; Rene Rochon, Detroit; Theodor Rosebury, St. Louis, Mo.; Philip L. Schwartz, New Brunswick, N. J.; Eugene W. Skinner, Chicago; H. Henry Weisengreen, San Francisco, and Leland E. Weyer, Washington, D. C.

Joseph R. Anderson, M.D., and Kenneth B. Babcock, M.D., both of Chicago, were named as consultants to the Council on Hospital Dental Service.

The Board of Trustees will meet in Dallas prior to the 99th session of the House of Delegates beginning November 5. The spring, 1959, meeting will be held at the Central Office March 12-14.

REFERENCE COMMITTEES FOR DALLAS MEETING ANNOUNCED

Association president William R. Alstadt has named his appointments to the reference committees that will study the reports and resolutions of Association Councils and state societies before they are submitted to the 99th annual House of Delegates session next month in Dallas. They are:

Constitution and Bylaws • Herbert L. Taub, Jamaica, New York, chairman; J. E. Berney, Davenport, Iowa; Frank W. Jordan, Louisville, Ky.; Thomas A. Price, Miami, Fla., and C. M. Taylor, Houston, Texas.

Credentials • Paul W. Zillmann, Buffalo, chairman; Allen R. Cutler, Boise, Idaho; P. B. Hair, Spartanburg, S. C.; Isadore L. Voda, Las Vegas, N. Mex., and George J. White, Riverton, N. J.

Rules and Order • Frank O. Alford, Charlotte, N. C., chairman; Homer D. Butts, Jr., Pittsburgh; John M. Deines, Seattle; R. Donald Hooper, St. Paul, and Edgar C. Schick, Albany, New York.

Dental Education • Leo M. Shanley, St. Louis, chairman; William A. Garrett, Atlanta, Ga.; Theodore E. Lilly, Dayton, Ohio; Chester D. Sitz, Austin, Minn., and Carlton H. Williams, San Diego, Calif.

Dental Research and Therapeutics • M. C. Hansen, Racine, Wis., chairman; Kenneth L. Dedekind, Salt Lake City; M. Duke Edwards, Montgomery, Ala.; M. A Hoghaug, Grand Forks, N. D., and Edward D. Leifer, Washington, D. C.

Dental Trade and Laboratory Relations • Robert J. Pollock, Oak Park, Ill., chairman; John B. Burns, Cheyenne, Wyo.; Roger V. Ostrander, Waterbury, Conn.; J. Guilford Sharp, Knoxville, Tenn., and Carl J. Stark, Cleveland.

Federal Dental Services • Rolla C. Calkin, Guthrie, Okla., chairman; Alva S. Appleby, Skowhegan, Maine; Sau Yee Chang, Lihue, Kauai, Hawaii; J. Robert Short, Kalamazoo, Mich., and Claude S. Williams, Hattiesburg, Miss.

Hospital Dental Service • Walter J. Winterhoff, Tucson, Ariz., chairman; John H. Bell, Windber, Pa.; Gory N. Casto, Jr., Charleston, W. Va.; G. B. Clendenin, Bethesda, Md., and James C. Donelan, Springfield, Ill.

Legislation and Judicial Procedures • William D. MacIntosh, Providence, R. I., chairman; Frank C. Carothers, Garnett, Kan.; J. B. Kennedy, Des Moines, Iowa; Bruce R. Kurtz, Pasadena, Calif., and Leo N. Thelen, Sioux Falls, S. D.

Miscellaneous Business • Thomas P. Fox, Philadelphia, chairman; James E. John, Sr., Roanoke, Va.; F. J. Martin, Medford, Wis.; H. Driscoll Reid, Randolph, Vt., and Richard C. Ritter, Bozeman, Mont.

President's Address and Administrative Matters • Isidore Teich, New York, chairman; Lyall O. Bishop, Walnut Creek, Calif.; Murray A. Leitch, Detroit; Edward W. Luebke, Chicago, and Crawford A. McMurray, Ennis, Texas.

Public Health • Harold M. Kramer, Portland, Ore., chairman; Joseph H. Griswold, Richmond, Ind.; William Roy Humphrey, Denver; Stephen M. Lyons, Summit, N. J., and Philip H. White, Boston.

Women's Auxiliary • E. A. W. Montgomery, Evansville, Ind., chairman; Norman C. Carlson, Lincoln, Neb.; B. C. Kingsbury, Jr., Vallejo, Calif.; Roland E. Morse, New York, and J. Melville Smith, New Orleans.

ROLE OF DENTAL PROFESSION IN CIVIL DEFENSE TO BE EXPLORED IN CONFERENCE PRECEDING ANNUAL SESSION

With the need for intensive defense preparation at all levels of society becoming daily more apparent, the Council on Federal Dental Services of the American Dental Association has arranged a civil defense conference to be held Saturday forenoon, November 8, in Dallas.

It is an acknowledged fact that participation on the part of members of the dental profession in case of national disaster will be vitally important to the defense of our country, thus calling for thorough training and organization of the nation's dentists.

An outstanding panel of speakers has been arranged. The members of the panel possess widely divergent backgrounds which will enable them as a group to cover virtually all phases of civil defense planning. They are: Representative Bruce R. Alger, Clyde H. Hendrix, Col. Joseph R. Shaeffer and Phelps J. Murphey.

Mr. Alger is U. S. Representative from Dallas and will give the Congressional viewpoint on civil defense.

Mr. Hendrix of Clinton, Iowa, is consultant on industrial, communication and organization policies to Office of Civil and Defense Mobilization Director Leo A. Heogh, and chairman of Iowa Civil Defense.

Colonel Shaeffer is consultant on medical care in disaster at the Walter Reed Army Institute of Research and will speak on medical problems peculiar to a disaster, with emphasis on the role of the dentist.

Dr. Murphey is a captain in the Dental Corps, U. S. Naval Reserve, and has a private practice in orthodontics. He is consultant to the Council on Federal Dental Services, American Dental Association, and A.D.A. representative on a Task Group set up by the National Commission on Emergency Medical Care. He will speak on "The Texas Plan for Training Dentists for National Civil Defense," since he is chairman of the Civil Defense Committee of the Texas Dental Association.

The conference will be formally opened by Percy T. Phillips, president-elect of the Association. E. Jeff Justis, chairman of the Council on Federal Dental Services, will preside.

A question and answer period will follow the presentation of papers, to be succeeded by an open discussion. The conference will take place at 9 A.M. in the Embassy Ballroom of the Statler Hilton Hotel.

NORTHWESTERN CLEFT PALATE TEAM TO LECTURE IN DALLAS

One of the more important features of the scientific program at the annual session of the Association in Dallas next month is the round table discussion of cleft palate management on Monday, November 10.

The importance and positive contribution of the general dentist to the integrated treatment program of cleft palate rehabilitation will be stressed. The par-

ticipants, all members of the staff of the Northwestern University Cleft Lip and Palate Institute, are: Kenneth Bzoch, moderator, Orion Stuteville, Frank Pirruccello, Harold Westlake, Shelley Rosenstein, Morton Rosen and Norman Olsen.

Periapical surgery, the use of high speed instruments and a tracheotomy are among the six procedures that will be performed on live patients for the television clinics scheduled for Tuesday, November 11, at the annual session. The clinics will take place at the University of Texas Dental Branch in Houston and will be transmitted over long-distance telephone lines to the auditorium in Dallas. Expenses for this project, which is a first for the Association, will be borne by E. R. Squibb & Sons.

Because of the success of the forum technic of presenting an essay program at the 98th annual session in Miami, it will be repeated this year. The forum is similar to the refresher course and offers more comprehensive coverage of the subject than the individual essay. Five forums will be presented; four to last one day and the fifth two days.

H. TRENDLEY DEAN ELECTED TO EUROPEAN ORGANIZATION

H. Trendley Dean, secretary of the Council on Dental Research of the Association, has been elected a corresponding member of the General Assembly of ORCA, the European Organization for Research on Fluorine and Dental Caries Prevention.

In a communication to Dr. Dean, the president of ORCA, O. Backer Dirks, said, in part:

> We do want to express by this election our great appreciation for the extremely valuable studies you have performed . . . The keen interest you have taken in (fluoridation in) Europe and the help you have given us are deeply appreciated by our organization. You have understood our problems and respected our often conservative standpoint on fluoridation.

DEMAND FOR ROOMS IN DALLAS EXCEEDS AVAILABLE SUPPLY

Requests for hotel and motel rooms in Dallas for the 99th annual session of the A.D.A. Nov. 10-13 have so far exceeded the supply that some of those attending may have to stay in Fort Worth, according to Louis M. Cruttenden, assistant secretary of the Association.

Dr. Cruttenden advises that only those people who have confirmed reservations should plan to attend the meeting. Rooms are available in Fort Worth, however, which is about 30 miles distant. Arrangements have been made for special bus service from Fort Worth to the auditorium where the meetings will be held.

All those holding reservations who find themselves unable to attend the Dallas session are urgently requested to notify the Central Office, 222 E. Superior St., Chicago 11.

CHANGES IN TIMES OF SOCIAL EVENTS AT DALLAS ANNOUNCED

Because such a large attendance is anticipated for the fashion show to be presented by the Neiman Marcus Store on Tuesday, November 11, for the entertainment of the women in Dallas for the A.D.A. annual session, two performances have been scheduled instead of the planned one.

The first will be a brunch at 11 A.M. and the second a luncheon at 2 P.M., both showings to be held in the Grand Ballroom of the Statler Hilton Hotel. Tickets for each event are $5 per person.

The schedule for the Open House at Everts Jewelry Store has also been changed. It will be held at 10 A.M. and 1 P.M. on Monday and Tuesday, November 10 and 11, at 1 P.M. on Wednesday and at 10 A.M. on Thursday.

The starting time of the Southwestern Exposition of Music and Folklore to be held in the Dallas Memorial Auditorium has been changed to 8 P.M., instead of 8:30 as previously planned.

Requests for tickets should be addressed to Edgar T. Gillean, Chairman of the Entertainment Committee, 3702 Fairmount Ave., Dallas.

PRESIDENT-ELECT PHILLIPS DELEGATE TO CANADA SESSION

William R. Alstadt, president of the American Dental Association, has designated Percy T. Phillips, president-elect, to represent the Association at the annual session of the Canadian Dental Association in Montreal October 26-29.

CHANGES IN JOURNAL FORMAT INSTIGATED FOR CENTENNIAL

Readers of THE JOURNAL may have noticed the improved layout and typography of the Announcements section, which makes for easier and faster readability of the items listed. (Pages A16-A24 this issue.)

This change is just a forerunner of the complete redesigning job which will be done on THE JOURNAL to celebrate the Association's centennial year in 1959. The new format will come into being with the January, 1959, issue.

International

ASSOCIATION REPRESENTED AT 47TH ANNUAL SESSION OF F.D.I.

Study over a two year period resulted in a comprehensive revision of the Articles and Regulations of the Fédération Dentaire Internationale which was approved at the 47th annual session in Brussels, Belgium, last month.

Harold Hillenbrand, secretary of the American Dental Association, was chairman of the bylaws revision committee. The changes involved will make possible more effective and more economical administration of the Federation. Dr. Hillenbrand also served as a member of the committee on finance.

The American Dental Association was represented by a complete voting delegation at all sessions of the General Assembly. It consisted of Percy T. Phillips, LeRoy M. Ennis, Obed H. Moen, Harold W. Oppice and Dr. Hillenbrand as delegates; J. Murray Gavel, Victor Carpenter, Earl Jones, Ralph Malone, and A. R. Dippel as alternates, and Donald Bragg, Truman E. Partridge and David G. Stahl as observers.

A proposal to increase the dues of member organizations was adopted but will not become effective until 1960. Also adopted was a proposal to consolidate certain activities of the offices of the treasurer and the secretary-general so that these activities will be centralized in London. In this connection further study was requested on the subject of moving Federation headquarters to Geneva, Switzerland.

In other actions by the General Assembly, first official welcome was given to F. Bruce Rice, New Zealand, new dental officer of the World Health Organization, who succeeded Carl Sebelius.

Thure Brandrup-Wognsen, Sweden, was re-elected president of the Federation and will serve in that capacity for the 1959 annual session to be held in New York coinciding with the centennial session of the A.D.A. Dr. Ennis and Dr. Moen were re-elected vice-presidents, and Dr. Hillenbrand was re-elected as honorary vice-president. O. A. Oliver was re-elected an honorary vice-president, also.

Hans Freihofer, Switzerland, was elected to the newly created office of Speaker of the General Assembly; Don W. Gullett, Canada, was elected a mem-

ber of the Council; G. H. Leatherman, United Kingdom, was re-elected secretary-general, and Jack Stork, Netherlands, treasurer.

In other actions of the General Assembly, many dentists from the United States were named to posts in the Federation. President of the Armed Forces Dental Services Commission is Brig. Gen. Thomas P. Fox, and among members of the commission are Brig. Gen. J. S. Cathroe, Maj. Gen. J. M. Epperley, Capt. G. L. Parke and Col. G. F. Jeffcott.

Shailer Peterson is vice-president of the Dental Education Commission, and J. W. Knutson is vice-president of the Public Dental Health Services Commission, and Jay Eshleman is a member of the latter commission.

F. A. Arnold is vice-president of the Scientific Commission on Dental Research which includes as members R. F. Sognnaes, H. Trendley Dean, M. K. Hine, Harry Lyons, J. B. MacDonald, G. C. Paffenbarger and D. B. Scott.

"On many occasions the officials and Council of the Federation expressed great appreciation for the excellent progress made with the supporting membership campaign in the United States," Dr. Hillenbrand said on his return from Brussels. "This progress is entirely due to the efforts of the national treasurer for the United States, Dr. Obed Moen, who carries on this effort with painstaking thoroughness and at considerable cost to himself in time and effort."

BRAZILIAN DENTAL SOCIETY FOUNDED, OFFICERS NAMED

Described as an organization designed to interpret the thoughts, hopes and cultural and civic ideas of the dental profession of Duque de Caxias, Brazil, the Associacão Odontológica of this region was recently formed.

Gsatão Reis was made honorary president of the society and the other officers are: president, Alberto de Pádua Oliveira; secretary general, Clebes Rangel; social director, J. Ribeiro Netto; financial director, Paulino J. Felipe; cultural director, Claudionor Marques dos Santos, and publicity director, Alberto Boquimpani.

CANADA LAUNCHES BUILDING OF SIXTH DENTAL SCHOOL

With an official sod-turning ceremony in July, Canada's sixth dental school got its formal start at the University of Manitoba in Winnipeg.

The dental faculty is expected to occupy its $1,135,000 building by the fall of 1959. The first class in dentistry starts next month in the medical building.

On hand for the ceremony, along with university officials including Dean J. W. Neilson, were three past presidents of the Canadian Dental Association, M. H. Garvin, H. J. Merkeley and K. M. Johnson, and officials of the Manitoba Dental Association and the Winnipeg Dental Society.

In Toronto, Premier Frost of Ontario recently laid the cornerstone for the new dental building at the University of Toronto. Dean Roy G. Ellis hopes to begin the 1959-60 school year in the new quarters.

YOKOHAMA DENTIST DELEGATE TO SAN DIEGO; TO STUDY HERE

A Yokohama dentist, Kiyoo Aoki, was one of 25 citizens of that city selected to visit San Diego, sister city of Yokohama, during its Pacific Ocean Festival last month.

Dr. Aoki is spending three months in the United States to take postgraduate courses in dentistry and to attend the 99th annual session of the American Dental Association in Dallas.

A member of the International College of Dentists, Dr. Aoki has received his doctorate in pathology and is the head of the Aoki Dental Clinic in Yokohama.

An "international" banquet was held by members of Delta Sigma Delta fraternity August 31 during the 46th annual meeting of the Federation Dentaire Internationale in Brussels, Belgium. The dinner was held in Erasmus House, Belgian home of the great humanist and theologian. Present from the United States were: Obed H. Moen, Watertown, Wis.; LeRoy M. Ennis, Philadelphia; J. Murray Gavel, Boston; Victor Carpenter, Boston, and Harold Hillenbrand, Chicago.

PAN AMERICAN DENTAL SESSION SET FOR NOVEMBER 18-23

The impressive buildings at University City, Mexico City, will be the setting for the Pan American Dental Congress November 18 through 23.

Roberto M. Ruff, president of the Mexican Dental Association, has issued an invitation to all United States dentists to attend this congress which follows the 99th annual session in Dallas of the American Dental Association.

It promises to be one of the most important dental meetings to be held in Latin America, Ruff points out. The congress will combine an excellent scientific meeting with an elaborate schedule of social, sight-seeing and special events in colorful Mexico. In addition there will be a number of special tours to such well-known places as Taxco, Acapulco, Puebla, Fortin, San Miguel and others.

Detailed information regarding the congress and reservations may be obtained by writing to: Pan American Dental Congress, Medical Arts Bldg., 1715 Pacific Ave., Dallas 1, Texas.

BOOKS, INSTRUMENTS NEEDED BY KOREAN DENTAL CLINIC

Books and instruments are needed by the dental department of Severance Hospital and Medical College in Seoul, Korea, acording to John McInnes of Tucson, Ariz., who recently completed a two year assignment with the dental department.

American dentists who wish to see their college textbooks or useful but surplus dental instruments put to use are urged by Dr. McInnes to send these goods to Korea. The dental department offers training in inpatient and outpatient dental service to recent graduates of Seoul National University Dental School.

The books and instruments may be sent directly to the dental department, Severance Hospital and Medical College, Seoul, Korea, or to Dr. McInnes, who will arrange for their shipment to Korea. Dr. McInnes' address is 1600 E. Speedway, Tucson, Ariz.

CENTRAL AMERICAN-PANAMA SCIENTIFIC PROGRAM PLANNED

Plans for the scientific program of the 2nd International Convention of the Odontological Federation of Central America and Panama have been completed. The meetings are scheduled for November 26-29 in San Jose, Costa Rica.

Symposiums, lectures and round table discussions will be conducted by Stanley Tylman, William L. McCracken, G. R. Lundquist, Sigurd Ramfjord, Robert Shira, Gustavo Berger, William F. Via, Jr., William R. Mann, James M. Dunning and Gustav Korkhaus.

Interested A.D.A. members are invited to attend the meeting. The secretary of the Federation is Raymond Pauly S., Apartado Postal 698, San Jose, Costa Rica, C. A.

FIRST ALBERTA, CAN., CITY APPROVES FLUORIDATION

Reportedly the first city in the Province of Alberta to approve fluoridation by plebiscite and then introduce it is Red Deer, with more than 12,000 population.

Fluoridation of the municipal water supply was started without announcement in June. No complaints were received, and public announcement was made about six weeks after fluoridation began. The feeding machine for the city cost about $4,500. The fluoride compound costs about $20 per month.

50TH ANNIVERSARY OF CHILEAN SOCIETY

La Sociedad Odontológica de Chile, oldest scientific organization of South America, will celebrate its 50th anniversary this year.

In honor of this event, an international congress of dentistry will be held in Santiago November 16-22. This is the fourth such congress to be held in Chile.

Distinguished members of the dental profession of Chile and many other countries will discuss problems of scientific and general interest. There will be three main divisions of interest: scientific; public dental health, and industrial. Within the scientific section four general areas are included. They are: (1) dental caries; (2) oral rehabilitation; (3) oral cancer, and (4) orientation of teaching in dentistry.

Members of the American Dental Association are invited to attend this congress. Further information may be obtained by writing to Dr. Juan Colin Montandon, president, or Dr. Gilberto Labarca Ramirez, secretary general; Sociedad Odontológica de Chile, Casilla 2575, Santiago, Chile.

ARGENTINE DENTAL SOCIETY HOLDS ANNUAL MEETING

The Asociación Odontológica Argentina held its annual meeting Aug. 13 to 17 in Corrientes. A varied program of clinics, films, lectures, table clinics and round table discussions was enjoyed by all who attended.

Raúl Otaño Antier was in charge of arrangements. José Manuel Lueje is the president of the Asociación Odontológica Argentina and Julio C. Barrancos Mooney is secretary.

Dental Societies

STATE SOCIETY CONFEREES PLAN HOSPITALS DISCUSSION

The role of the state society in developing hospital dental service will be projected from three viewpoints at the Conference of State Society Officers to be held Sunday, November 9, at the Statler Hilton Hotel, Dallas.

Gerald D. Timmons, dean of the School of Dentistry, Temple University, will lead the discussion on hospital services. Gustav O. Kruger, Jr., will speak on the viewpoint of the oral surgeon, David Tanchester will give the point of view of the general practitioner and Bernard Conway, secretary of the Council on Legislation of the A.D.A., will present the legal aspects.

Louis Cruttenden, assistant secretary of the Association, will speak on how the A.D.A. relief program operates, and Maynard K. Hine, president of the Fund for Dental Education, Inc., will explain the interest of the state society in financial assistance for dental students. Peter C. Goulding, secretary of the Centennial Staff Committee, will outline participation of state societies in the A.D.A. centennial observance.

Harold E. Tingley will preside at the conference. Preceding a luncheon at 1 P.M., the nominating committee will report, and after the luncheon, Percy T. Phillips, president-elect of the Association, will address the group.

DENTAL MEETING TO FEATURE RESEARCH BY TWO SCHOOLS

Pioneer research projects which may radically affect future dental practice will be the feature of an entire evening's session of the forthcoming 34th annual Greater New York Dental Meeting to be held at the Hotel Statler Hilton, New York City, December 8-12.

One of the highlights of the recent centennial session of the Indiana State Dental Association was the unveiling of a large bronze tablet honoring the presidents of the organization for the past hundred years. Beginning with John F. Johnston, 1858, and continuing through the years to Maynard K. Hine, 1958, each president and his year of tenure are listed. The plaque is a gift from George W. Davidson, who has known personally the past 59 presidents, and his son, George M. Davidson. It has been mounted at the Indiana University School of Dentistry.

This session will present jointly, for the first time in the history of the annual event, leading scientific investigators of both Columbia and New York University schools of dentistry.

Other subjects to be explored in lectures and symposiums are the effect of high speed drills on dental pulp and an appreciation and interpretation of the use of roentgenology in caries control.

"Luncheon and Learning" will provide registrants with an opportunity to share ideas with acknowledged authorities while seated at tables of their choice. At the head of each table will be a dental leader who, during the luncheon, will moderate an informal roundtable discussion of his specialty. Attendance will be limited to ten persons per table for

Perfect smiles are exhibited by the two winners of Chicagoland's Perfect Mouth Contest conducted at the Back-of-the-Yards Council's Free Fair. Bruno Petrulis, left, president of the Amurol Products Company, manufacturers of sugarless gums and candies, congratulates Mrs. Viola Andree and Gordon Young. The contest was sponsored jointly by the Amurol company and the Chicago Dental Society. Contestants numbered 4,500.

this event which is the new format of the traditional alumni luncheon.

Further information is available from Mrs. Mabel Purdy, Executive Secretary, Room 106A, Hotel Statler Hilton, New York 1.

Dental Education

N.Y.U. COLLEGE OF DENTISTRY MOVES TO NEW QUARTERS

Half a century of clinical care and academic training ended at 209 East 23rd Street in Manhattan when the College of Dentistry of New York University moved from that address to occupy a newly-acquired ten-story building at 421 First Avenue, near the New York University-Bellevue Medical Center.

The move, which took place at the end of August, brought the total college plant, including the Basic Science Building and the Murry and Leonie Guggenheim Foundation Institute for Dental Research, within a one-block area, and completed the development of the NYU Dental Center.

Raymond J. Nagle, dean of the College of Dentistry since 1953, points out that the new quarters "will at least double the area for the teaching of the clinical sciences in dentistry."

Although eighth in the order of its founding, the college is now the fourth oldest dental school in the United States. It is also, in terms of enrollment, the largest in the country.

SAN FRANCISCO SCHOOL NAMES NEW FACULTY APPOINTMENTS

Dean John Tocchini of the School of Dentistry of the College of Physicians and Surgeons of San Francisco has announced the following faculty appointments:

I. Irwin Beechen, to chairman of the section on pedodontics. Dr. Beechen was formerly associate clinical professor of operative dentistry in pedodontics.

Alvin C. Hileman, to chairman of the department of periodontology. Dr. Hileman was formerly assistant professor of oral pathology and periodontics at the University of Washington, Seattle.

Edward P. Boero, to chairman of the section on fixed and removable partial dentures. Dr. Boero has been a member of the staff for many years, and served with the U. S. Air Force with the rank of Major.

Herbert E. Ward, to assistant to Dr. Boero. Dr. Ward, a staff member and a graduate of the college, will also be audio-visual director for the college.

GRANT MADE TO COLUMBIA BY CEREBRAL PALSY UNIT

Columbia University's School of Dental and Oral Surgery has received a grant of $14,400 from the United Cerebral

Palsy Research and Educational Foundation. Presentation of the check was made by Harry B. Fischer, president of the United Cerebral Palsy Associations of New York State, to Gilbert P. Smith, associate dean of the Faculty of Medicine for Dental and Oral Surgery.

The grant is for postgraduate courses in the training of dentists to provide dental care for cerebral palsy patients. The program is conducted by Solomon S. Rosenstein, professor of dentistry and director of the division of pedodontia.

Created in 1950, the project has annually appointed two dentists as Fellows for a period of two years to work in the field of children's dentistry relating to cerebral palsied youngsters.

UNIVERSITY OF CALIFORNIA OFFERS RESEARCH-TEACHING

The School of Dentistry, University of California in San Francisco, instituted a research-teaching training program under the direction of Hermann Becks, professor of dental medicine, in 1957, with the financial support of the U. S. Public Health Service in Washington. Three additional trainees will be added this year.

The program provides facilities and instruction in basic research and the principles of biology as they pertain to dentistry. It also provides a good background for a teaching career and advanced scientific investigation as well as clinic practice. If the trainee is qualified and wishes to do so, he may take work leading to the M.S. or Ph.D. degrees, or both. The annual stipend ranges from $4,000 to $6,000. This program is not limited to dental students or dentists, but is open to graduate and undergraduate students in biochemistry, physiology, pathology, medical microbiology and anatomy.

Further information may be obtained by writing to: Dr. Hermann Becks, School of Dentistry, University of California, San Francisco, 22.

AWARD GRANTED FOR RESEARCH AT UNIVERSITY OF MIAMI

The University of Miami has for the first time received grants for dental research. In a joint project with the National Children's Cardiac Hospital of Miami, the university will carry on research into the cytotoxic mechanisms of local dental anesthesia.

A grant of $10,558 from the U. S. Army and a second award of $2,000 from the Council on Dental Therapeutics of the American Dental Association will enable Doran D. Zinner, director of dental research at the hospital and research assistant professor of microbiology at the university, to pursue studies in the changes in cellular structure and function resulting from ordinary dental anesthetics.

Dr. Zinner's associates in the program will be James M. Jablon, Ph.D., bacteriologist of the hospital, and Murray Sanders, M.D., professor of microbiology at the university.

PROSTHODONTICS RESIDENCY OPEN AT BROOKLYN HOSPITAL

The Jewish Chronic Disease Hospital of Brooklyn, N. Y., is accepting applications for a residency in prosthodontics for one year. A satisfactorily complete internship at a hospital approved by the American Dental Association is required.

Further information may be obtained from: Dr. Joseph J. Obst, Director of Dentistry, Jewish Chronic Disease Hospital, Rutland Rd. and E. 49 St., Brooklyn 3.

NEW YORK UNIVERSITY OFFERS FELLOWSHIPS, TRAINEESHIPS

The New York University College of Dentistry is now offering fellowships and traineeships for graduate study, Dean Raymond J. Nagle has announced. They are available, in part, through research

and training grants from the National Institute of Dental Research of the U. S. Public Health Service.

Graduates of liberal arts and dental colleges are eligible for the awards, which vary in amount with the needs and qualifications of the accepted candidates.

Further information may be had by writing to: E. D. Goldsmith, Research Coordinator and Training Director, College of Dentistry, New York University, 421 First Ave., New York 10, N. Y.

BOSTON HOSPITAL PRESENTS SEMINAR IN PERIODONTICS

A two week seminar in periodontics will be held October 6-17 at Beth Israel Hospital, Boston, under the direction of Henry M. Goldman and Bernard Chaikin.

The objective of this seminar is to present to the practitioner all of the technics employed in periodontal therapy as well as theoretical background. It will include etiology, diagnosis and treatment of various diseases of the supporting tissues of the teeth. Periodontal pocket therapy as well as an over-all mouth rehabilitation program will be stressed.

The tuition fee is $350 and a deposit of $150 is necessary for enrollment. Information may be obtained from: Director of Public Relations, Beth Israel Hospital, 330 Brookline Ave., Boston 15.

VARIOUS SUBJECTS OFFERED IN POSTGRADUATE COURSES

Alabama • During the month of December the University of Alabama School of Dentistry will present courses in oral surgery for the general practitioner and in preventive orthodontics.

The former, conducted by Robert D. Shira, will be held December 6-8, and the latter, conducted by Sidney B. Finn, will be December 13-15.

Further information may be obtained from: Director, Refresher Course Program, University of Alabama School of Dentistry, 1919 Seventh Ave. S., Birmingham, Ala.

Boston • The oral pathology section of the department of stomatology, Division of Graduate Studies, School of Medicine, Boston University, announces a one-week course in oral pathology January 12-16, 1959.

The enrollment fee for the course which is under the direction of Henry M. Goldman, Kurt Thoma and Jack Bloom, is $200. Application may be made to the department of stomatology, Massachusetts Memorial Hospitals, Boston.

California • A course in the hydrocolloid indirect technic for inlays and bridges will be offered October 18-19 by the University of California School of Dentistry in San Francisco. Morris J. Thompson will be the instructor.

Taking and pouring impressions, treating stone models, manipulation of wax and investing and casting will be performed by each member of the class.

The enrollment fee is $60 and some incidental supplies will have to be purchased. Application may be made to: Ben W. Pavone, Director, Postgraduate Education, University of California Medical Center, School of Dentistry, San Francisco 22.

Georgetown • A refresher course in clinical occlusion is scheduled for October 10-14 at Georgetown University School of Dentistry, under the direction of Arne G. Lauritzen. The tuition fee is $150 and enrollment is limited.

At the same school a postgraduate course in pedodontics for the general practitioner will be given by Sidney B. Finn October 4-5. The tuition for this course is $50.

Application for both courses should be made to: Francis L. Simmons, Registrar, School of Dentistry, Georgetown University, Washington 7, D.C.

Loyola, New Orleans • Two short postgraduate courses are being offered by the School of Dentistry, Loyola University of the South, New Orleans.

The first, on oral diagnosis and oral medicine, will be given by Lester W. Burket of the University of Michigan November 14-15. The second will be on operative dentistry with high speed rotary instruments and will be conducted January 17-18 by C. L. Sockwell of the University of North Carolina.

Further information may be obtained from: Victor B. Marquer, 2213 S. Carrollton Ave., New Orleans 18.

Michigan • The W. K. Kellog Foundation Institute, Graduate and Postgraduate Dentistry,

University of Michigan, Ann Arbor, will offer the following postgraduate courses through December:

Partial denture prosthesis, October 13-24; hydrocolloid and rubber base inlay technics, October 27-29; higher speeds for rotating instruments, October 30-31 and December 15-16; dental treatment for handicapped children, November 17-18; amalgam restorations, November 17-19; endodontics, December 1-12; minor oral surgery, December 1-12; control of apprehension and pain in dentistry for children, a course for the family dentist, December 8-9; periodontics, December 8-19.

A brochure containing detailed information and a complete schedule for the entire year is available from the office of William R. Mann, associate director of the Institute.

New York • A 48-hour postgraduate course in fixed partial prosthesis to emphasize the use of elastic impression materials for fixed bridge construction will be offered by New York University's College of Dentistry. The course is to be given from 1 to 4 p.m. on Fridays from January 16 through May 8. It will be directed by Edward G. Kaufman, assistant professor of fixed partial prosthesis.

Information on this and other postgraduate dental courses can be obtained by writing to: Director, Postgraduate Division, College of Dentistry, 209 E. 23rd St., New York 10.

Northwestern • Three courses are being offered during November and December by Northwestern University Dental School.

Recent advances in medicine of interest to the dental practitioner is scheduled for November 17-19; clinical features of oral lesions will be studied December 1-3, and current concepts in operative dentistry will be explored in another course December 1-3.

Tuition for each course is $100 and application may be made to: Director of Dental Postgraduate Study, Northwestern University Dental School, 311 E. Chicago Ave., Chicago 11.

Pennsylvania • A course on dentistry for handicapped children will be presented at the School of Dentistry, University of Pennsylvania, December 1-3. It is arranged to give the practitioner a better understanding of the dental problems and treatment of children who suffer from cerebral palsy, mental retardation, muscular dystrophy, multiple sclerosis, and other handicapping conditions.

Details may be had by writing to: Postgraduate Courses, School of Dentistry, University of Pennsylvania, 4001 Spruce St., Philadelphia 4.

Southern California • Dentistry for children is the subject of a postgraduate course to be given November 2-7 by the School of Dentistry, University of Southern California.

The tuition fee is $170 and application must be made by October 10 as the enrollment is limited. Information may be obtained from: Division of Postgraduate Instruction, University of Southern California, School of Dentistry, University Park, Los Angeles 7.

Washington • The School of Dentistry, University of Washington, Seattle, has announced a two-day course in the management and control of the dental practice for better dentistry. It will be conducted October 16-17 by Robert K. Stinaff, president of the American Academy of Dental Practice Administration, Akron, Ohio.

No limit has been placed on the course enrollment. The tuition fee is $45 and a check for at least $25 must accompany the application form which may be obtained from the department of postgraduate dental education of the university.

Western Reserve • A postgraduate course in endodontics will be given November 6-8 by Louis I. Grossman at the School of Dentistry at Western Reserve University.

The fee for this course is $75. Application should be made to Philip Burwasser, Director of Postgraduate Education, Western Reserve University, 2165 Adelbert Rd., Cleveland 6.

Legislation

REPRINTS AVAILABLE OF THE DENTIFRICE HEARING REPORT

Reprints of the Congressional report on false and misleading advertising claims for dentifrices are available from the Association.

The report, which was sharply critical of the claims of dentifrice manufacturers, was issued by the Committee on Government Operations of the House of Representatives after testimony by A.D.A. representatives.

Copies can be obtained on request from the A.D.A. Council on Legislation, 222 E. Superior St., Chicago 11.

LABORATORY RELATIONS WITH DENTAL PROFESSION EXPLORED

More than 60 persons attended a symposium on programs affecting relations between the dental profession and the dental laboratory group which was presented by the Council on Dental Trade and Laboratory Relations at the Central Office September 29-30. Representatives of many state dental societies, state dental examining boards and the larger component dental societies attended the symposium together with representatives of the National Association of Dental Laboratories and the American Dental Trade Association.

On Monday, September 29, voluntary programs providing recognition for auxiliary groups were discussed by John Hinman, M.D., assistant secretary, Council on Medical Education and Hospitals, American Medical Association, Shailer Peterson, secretary, Council on Dental Education, American Dental Association, and Bernard J. Beazley, secretary, Council on Dental Trade and Laboratory Relations, A.D.A.

A panel discussion on occupational legislation was presented by William Frederick, The Council of State Governments, George E. Hall, law department, A.M.A., William M. Trumbull, professor of law, Northwestern University, and Joseph L. Champagne, secretary, Michigan State Board of Dentistry. Bernard J. Conway, secretary, Council on Legislation, A.D.A., was moderator.

On Tuesday, September 30, other aspects of dental laboratory legislation were covered by Robert E. Paulsen, executive secretary, Washington State Dental Association, Inc., Don W. Gullett, secretary, Canadian Dental Association, and Robert B. Hughlett, representative of the Florida State Board of Dental Examiners. Homer Dickson, president of the National Association of Dental Laboratories, Inc., presented the dental laboratory viewpoint. J. Fred Folley, member of the Council on Dental Trade and Laboratory Relations of the A.D.A., reviewed the Association's policy on dental laboratory legislation. This session was moderated by J. Eugene Ziegler, member of the Council on Dental Trade and Laboratory Relations.

The Council held a meeting at the close of the symposium.

'DENTURIST' CONVICTIONS UPHELD BY OKLAHOMA COURT

The criminal court of appeals of Tulsa, Okla., last month upheld the conviction of Robert M. Shoemaker and Gilbert A. Crosbie on charges of practicing dentistry without licenses.

In Illinois, the Independent Dental Laboratory Association appeared before the Illinois Medical Practice Act Commission to present arguments in favor of their "denturist" proposals. The commission will consider these in executive session and on October 8 will receive presentations from representatives of the Illinois Dental Society.

SOME POSTGRADUATE WORK AND EQUIPMENT RATE TAX RELIEF

Regulations issued by the Internal Revenue Service and a tax revision bill passed by the 85th Congress are of interest to dentists.

Expenses for certain types of postgraduate education can be claimed as deductions for the years back to and including 1954. The deadline for filing claims for 1954 deductions was originally April 15. It has now been extended to November 3, so that taxpayers who had not had time to file claims under the earlier regulation may request reconsideration of their claims from their District Tax Directors.

The tax revision is applicable to small business and provides that taxpayers, such as a dentist purchasing new equip-

ment, may elect to write off 20 per cent of the cost of tangible personal property in the year of acquisition, in addition to regular depreciation on the balance. The additional first year depreciation allowance applies to used as well as to new property acquired for use in the taxpayer's trade or business. The provision applies to taxable years ending after June 30, 1958. Additionally, the new law increases the maximum limitation on the dental and medical expense deduction for a taxpayer who is over 65 and is disabled.

National Defense

William McGill Burns

WILLIAM McGILL BURNS MADE REAR ADMIRAL, RESERVE

Announcement was made last month of the selection of William McGill Burns of Garden City, N. Y., for promotion to the grade of Rear Admiral in the Dental Corps of the U. S. Naval Reserve. He is the fourth reserve dental officer to be honored by the Navy's highest rank.

Dr. Burns is a commanding officer of the Naval Dental Reserve Company 3-9 in New York, and, during World War II, he served as state chairman for procurement and assignment of dentists in New York. He is a consultant to the U. S. Naval Hospital, St. Albans, N. Y., the U. S. Veterans Hospital, Brooklyn, and Kings Hospital in New York. He was a member of the A.D.A. Board of Trustees from 1946 to 1951. He has been president and treasurer and is a life member of the Second District Dental Society of New York.

MEDICO-DENTAL SYMPOSIUM TO HEAR WERNHER VON BRAUN

The 9th annual Military Medico-Dental Symposium on Space Medicine will be held October 23 at the U.S. Naval Hospital, Philadelphia.

Wernher von Braun, director, Development Operations Division, Army Ballistics Missile Agency, will be the principal speaker. Thomas P. Fox, Brigadier General, Dental Corps, U.S. Army Reserve, is general chairman. Dr. Fox, professor of oral medicine, Jefferson Medical College, is the first dental officer to head the symposium committee.

In the evening, Dr. von Braun will give the address at a special convocation at the Temple University Dental-Pharmacy Auditorium and will be awarded an honorary degree of doctor of science.

ROBERT E. STEWART CITED FOR PROSTHETICS SERVICE

The Veterans Administration has given special commendation to Robert E. Stewart, director of the agency's Prosthetic and Sensory Aids Service in Washington, D. C., for his contributions to the VA Prosthetics program.

Dr. Stewart was cited by Dr. William S. Middleton, VA Chief Medical Director, for efficiency, leadership and coordination of interagency efforts in behalf of disabled veterans and citizens.

A graduate of Creighton University School of Dentistry, Dr. Stewart entered military service in 1942. In 1946 he was appointed to the Prosthetic and Sensory Aids Service of the VA Department of Medicine and Surgery to develop the plastic eye and restorations clinic program. He was appointed director of the service in 1955.

EXCEPTIONAL SERVICE AWARD GOES TO JOHN E. FAUBER

Veterans Administration's highest award, the exceptional service award, has been presented to John E. Fauber, head of the agency's dental program, in Washington, D. C., by the Administrator of Veterans Affairs, Sumner G. Whittier.

The honor was given for Dr. Fauber's leadership in bringing the VA outpatient dental program to its present state of stability and administrative soundness. He was appointed to his present position as assistant chief medical director for dentistry at the VA central office in September 1952. At that time, the outpatient dental program was mired down by huge backlogs of World War II and Korean conflict veterans awaiting dental care. Changes initiated by Dr. Fauber have placed this program on a current and efficient basis of operation and brought about substantial savings to the government.

John E. Fauber

PRESIDENT-ELECT PHILLIPS CHOSEN BY SURGEON GENERAL

Secretary of the Navy Thomas S. Gates, Jr., has approved the appointment of Percy T. Phillips, president-elect of the American Dental Association, as Honorary Civilian Consultant to the Surgeon General of the Navy.

Public Health

HIGH SCHOOL FOOTBALLERS TO WEAR LATEX MOUTH GUARDS

Standard equipment for approximately 375 high school football players in Philadelphia this season will include special latex mouth protectors. The players were fitted for the mouth guards at the University of Pennsylvania School of Dentistry.

In a study made of two of the city's high school gridiron squads last year, 84 boys were fitted with the guards. Not one sustained an injury to head, face or mouth. For the 596 boys from other schools who wore no guards, there were 21 tooth injuries and 26 head and face injuries reported.

The University of Pennsylvania School of Dentistry and the Temple University Dental School made and fitted test protectors under the supervision of the heads of prosthetics departments of both universities.

At the outset, a major reservation by the physical education department of the Philadelphia Board of Education was

whether the boys could talk and call signals while wearing the mouth guards. In presenting this project to the directors of athletics of the city schools, Abram Cohen, supervisor in charge of the Dental Service of the Board of Education, wore one in his mouth during the entire discussion.

SHAILER PETERSON NAMED TO P.H.S. ADVISORY COMMITTEE

Shailer Peterson, secretary of the Council on Dental Education, has been named a member of the National Advisory Dental Research Council Training Grant Committee of the National Institutes of Health as a special consultant to the Public Health Service.

Members of this committee provide advice to the council, and through the council to the Surgeon General of the Public Health Service, on matters relating to training grants throughout the nation in the field of dental health.

The training committees have the responsibility of (1) reviewing applications for training grants in their respective fields and making recommendations to the Advisory Councils, and (2) surveying, as scientific leaders, the status of training in their fields in order to determine areas in which activities should be initiated or expanded.

DR. HELMHOLZ, FLUORIDATION SUPPORTER, DIES AT MAYO

Dr. Henry F. Helmholz, 75, died August 19 at Rochester, Minn. He was internationally known in the field of pediatrics and a champion of fluoridation of public water supplies.

Dr. Helmholz was chief medical consultant for the United Nations international children's emergency fund in Europe during 1947 and 1948; chief consultant to the midcentury White House conference on children and youth in 1950, and president of the fifth international congress of pediatrics in 1947.

He was head of the section on pediatrics at the Mayo Clinic, Rochester, Minn., from 1921 to 1947, and actively supported the cause of fluoridation. He was also chairman of the committee on health of the National Congress of Parents and Teachers.

'FITNESS OF YOUTH' COMMITTEE PASSES DENTAL EXAM MOTION

In a meeting last month at Fort Ritchie, Md., the President's Citizens Advisory Committee on the Fitness of American Youth passed a motion which had been introduced by C. Willard Camalier and Fritz Pierson.

Dr. Camalier, assistant secretary of the Association, and Dr. Pierson, trustee from the 11th district, were delegates representing the dental profession. The motion was:

> It is moved that the Council reiterate its position that parents, children, schools, and youth-serving agencies and organizations be informed of the importance of early and periodic medical and dental examinations and urge all citizens, agencies and organizations to cooperate, whenever possible, with approved programs designed to enhance the health, appearance and well-being of the children and youth of the nation.

ARKANSAS BOARD OF HEALTH GETS NEW DENTAL DIRECTOR

Durward R. Collier, Little Rock, has been named director of the division of dental health, Arkansas State Board of Health.

Dr. Collier, a graduate of Mississippi State College, received his D.D.S. degree from the University of Tennessee College of Dentistry and his M.P.H. degree from the School of Public Health of the University of Michigan. He has served as a dental extern with the Tennessee Department of Public Health.

General

NATIONAL BOARD EXAMINATION DATES NAMED: DECEMBER 1-2

The National Board of Dental Examiners will hold its winter examinations December 1-2. Applications must be received by October 31 for these tests.

The spring examinations will be held April 2-3, 1959, for which applications should be received by March 2.

The states and agencies that recognize National Board Certificates include: Alabama, Alaska, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, Nevada, New Hampshire, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, U. S. Public Health Service, U. S. Army, U. S. Navy and Hawaii.

Applications and information describing the examinations may be obtained by writing: The Council of the National Board of Dental Examiners, American Dental Association, 222 E. Superior St., Chicago 11.

17TH MID-CONTINENT DENTAL CONGRESS SET FOR ST. LOUIS

One of the fastest growing regional dental meetings of the Midwest will be held October 12-15 when the 17th Annual Mid-continent Dental Congress is held in St. Louis.

Under the sponsorship of the St. Louis Dental Society, a complete scientific program has been arranged, with table clinics, commercial and scientific exhibits, and a social program with a special entertainment schedule for wives.

Among the outstanding clinicians who will be presented are Roland D. Fisher, Lee Roy Main, F. D. Ostrander, W. Harry Archer, William F. Via, Jr., George H. Moulton, Eugene W. Skinner and Hollis A. Askey.

A special four hour course in clasp-retained removable partial dentures will be given Sunday, October 12, starting at 10 A.M. by John F. Johnston, Roland W. Kykema and Donald M. Cunningham of the Indiana University School of Dentistry.

For reservations application should be made to John J. Purcell, 9024 Manchester Ave., Brentwood 17, Mo.

HISTORY OF THE ASSOCIATION RAPIDLY NEARING COMPLETION

The vast amount of work that has gone into the gathering and sorting of material for the History of the American Dental Association has resulted in a wealth of fascinating facts and interesting sidelights on the dental profession.

Robert McCluggage, Ph.D., professor of history at Loyola University and author of the book, reports that the first rough draft was completed in August and progress is rapid on the editing, revising and polishing.

The history will be published by the Association and will be ready for sale during the Centennial year of 1959.

IMPLANT DENTURES ACADEMY HOLDING DALLAS MEETING

The American Academy of Implant Dentures will hold its annual meeting November 7-9 in Dallas prior to the annual session of the American Dental Association.

These meetings will be held at the White Plaza Hotel in Dallas, according to Roy L. Bodine, Jr., president.

ALPHA OMEGA FRATERNITY TO HOLD DINNER AT CONVENTION

All national officers of the Alpha Omega fraternity will attend the Association's annual session in Dallas November 10-13. The fraternity dinner will be held Monday, November 10, at the Adolphus Hotel. Guests of honor for the occasion will be the deans of the dental schools of the United States and Canada. John Sherman, national president of Alpha Omega, made these announcements at the national council meeting of the organization at Mount Freedom, N.J., in June.

Harry Feltman, Jr., 4102 Semmons Ave., Dallas, has been named chairman of arrangements for the Alpha Omega meeting. He should be contacted for further details regarding arrangements and reservations for the banquet.

DENTAL MEDICINE MEETING SETS DIAGNOSTIC CLINICS

Two of the outstanding features of this year's meeting of the American Institute of Dental Medicine will be seminars and diagnostic clinics. The affair, celebrating the Institute's 15th anniversary, will be held October 12-16 at Palm Springs, Calif.

The afternoon seminars, and the clinics, will be limited to 15 participants, and registrants will be accepted in the order of application.

ORAL PATHOLOGY FELLOWSHIP EXAMINATION SCHEDULED

An examination for elevation to Fellowship in the American Academy of Oral Pathology will be held April 17, 1959, at the University of Minnesota, Minneapolis.

Applications for the Fellowship examination may be obtained from the office of the secretary-treasurer, Robert J. Gorlin, School of Dentistry, University of Minnesota, Minneapolis 14. No applications will be accepted after January 1.

DENTAL LAB SURVEY RETURNS SHOW SURVEY ACCEPTANCE

Gratifying cooperation on the part of owners of dental laboratories has been evidenced by the number of dental laboratory survey questionnaires which have already been filled out and returned, according to the Council on Dental Trade and Laboratory Relations.

The Council has announced that the deadline for returning completed questionnaires has been extended to October 15 to enable all dental laboratory operators to participate in the survey project.

EARL HENRY MEMORIAL CLINIC SCHEDULED AT KNOXVILLE

The 12th annual memorial clinic in honor of Earl Henry, the only Tennessee dentist killed in action during World War II, will be held October 17-18 at the University Center, Knoxville, Tenn. The clinic is under the sponsorship of the Second District Dental Society of Knoxville and the University of Tennessee College of Dentistry.

The subjects to be presented are "Practical Prosthodontics" by Henry C. Parker, and "Oral Surgical Procedures in General Practice" by Thomas W. Jones.

There will be a football game between Alabama and Tennessee universities on Saturday, October 18, tickets for which should be obtained from the respective athletic association offices.

DENTAL LABORATORIES GROUP TO HOLD CERTIFICATION TEST

The 8th annual House of Delegates meeting of the National Association of Dental Laboratories will be held October 8-12 at the Somerset Hotel in Boston.

A feature of the five day meeting will be the first certification examination.

Shailer Peterson, secretary of the Council on Dental Education of the American Dental Association, will attend the meeting.

PROSTHODONTICS ACADEMY SETS 4TH ANNUAL SESSION

Research group studies and panel discussions will be features of the fourth annual meeting of the Greater New York Academy of Prosthodontics which will be held December 6-7 at the School of Dental and Oral Surgery of Columbia University.

Complete dentures and occlusal rehabilitation will be the subjects of the panel discussions and the research group studies will be on mandibular movements, rest position, hinge axis, and porcelain fused to metal.

Carlisle C. Bastian is president of the Academy and Ira E. Klein, program chairman.

DENTAL MEDICINE ACADEMY PLANS MEETING IN NEW YORK

The American Academy of Dental Medicine will hold its 13th mid-annual meeting and luncheon at the Hotel New Yorker, New York City, on Sunday, December 7. The business meeting for members at 10 A.M. will precede a luncheon and scientific session for Academy members and friends starting at 12:30 P.M.

The afternoon session on gingival tissue will be presided over by Henry M. Goldman, Maury Massler and Stanley D. Tylman.

Reservations may be made through Dr. Walter I. Levine, 809 Cathedral St., Baltimore, Md.

1959 CASE HISTORY SERIES OFFERED TO GROUP MEMBERS

The American Institute of Dental Medicine announces that complete case history series for the years 1953-58, as well as for 1959, are available to subscribers to its case history service.

The case histories include original 35 mm. Kodachrome slides of pathologic conditions of the oral cavity and jaws, accompanied by pertinent laboratory findings, medical background, roentgenograms, photomicrographs, diagnostic criteria and whatever else may be indicated in each individual case, along with a "general discussion" of the disease. A loose leaf binder and matching Kodachrome slide box is also furnished.

A subscriber to the case history service is entitled to full membership in the Institute. For further information communications should be addressed to the secretary, Mrs. C. Novembri, 2240 Channing Way, Berkeley 4, Calif.

CHILDREN'S DENTAL HEALTH POSTERS NOW AVAILABLE

A large poster designed for use on outdoor advertising billboards has been prepared for the 1959 observance of National Children's Dental Health Week.

Of standard size, 104 inches high and 234 inches wide, comprising 24 sheets, the posters are in white, black and red and carry the message, "It's the Brushing that Counts" and "Unlock Your Smile."

They may be ordered from the Order Department at the Central Office for $6 each.

ENDODONTISTS TO HOLD COCKTAIL PARTY IN DALLAS

The American Association of Endodontists will hold a cocktail party at the Dallas Club in the Medical Arts Building in Dallas on November 11.

Members are asked to bring their AAE cards and attend the party which is scheduled from 4 to 6 p.m. Further information may be had from J. Hobson Crook, 834 Medical Arts Bldg., Dallas.

MIDWEST PERIODONTIC GROUP INVITES ASSOCIATE MEMBERS

The Midwest Society of Periodontology announces that applications for associate membership in the society are now being

accepted from interested general practitioners. Inquiries should be addressed to the secretary, Dr. Genevieve Roth, University of Kansas City School of Dentistry, Kansas City 6, Mo.

The annual scientific session of the society will be held in Chicago February 9, and announcement of the program will be made at a later date.

NEW YORK STATE NEEDS CIVIL SERVICE DENTISTS, HYGIENISTS

Dentists and senior dentists are needed in New York State institutions in the departments of correction, health, mental hygiene and social welfare. Applications are accepted continuously for these positions and also for the posts of dental hygienists in various state institutions.

Information for candidates for these positions may be obtained from the New York State Department of Civil Service, Albany 1, N. Y.

PIONEER ORAL SURGEON OF NORTHERN INDIANA RETIRES

Alvin Wasser, LaPorte, Ind., has retired from the practice of dentistry, having been associated with the profession for 61 years.

A native of Mercer County, Pa., Dr. Wasser became an apprentice in the laboratory of his brother, George Wasser, a dentist then practicing in LaPorte, in 1897.

He graduated from the University of Illinois School of Dentistry in 1902, having worked his way through school as a demonstrator of laboratory work.

Dr. Wasser was one of the first oral surgeons of northern Indiana.

A testimonial dinner was given in his honor at LaPorte on September 9.

DENTAL EDITORS' CONFERENCE, BUSINESS MEETING NOV. 8

The American Association of Dental Editors will hold its annual conference and business meeting on Saturday, November 8, in the afternoon and evening. The events will be held in the Statler Hilton Hotel in Dallas, Texas.

The date of the meeting was erroneously listed in the announcement section of the September issue of the JOURNAL.

BROOKLYN JEWISH HOSPITAL NAMES NEW DENTAL DIRECTOR

The Board of Trustees of the Jewish Hospital of Brooklyn announces the appointment of Louis J. Raphael as director of the department of dentistry. In addition, Dr. Raphael is senior attending oral surgeon to the head and neck division of the department of surgery of the hospital.

Also • Thomas W. King, Jr., Butler, Pa., has been chosen as a Republican candidate for the Congress from the 25th District in Pennsylvania . . . The 10th session of the World Health Organization's Regional Committee for the Americas is in progress in San Juan, Puerto Rico. The Fédération Dentaire Internationale is represented at the meeting by A. R. Baralt, Jr., dean of the School of Dentistry, University of Puerto Rico . . . Raymond J. Nagle, dean of the College of Dentistry, New York University, will be the guest of honor at the annual dinner of the Brooklyn Dentists' Division of the Federation of Jewish Philanthropies, to be held at the Unity Club, Brooklyn, October 16.

Current Literature

GENERAL ANESTHESIA AND PRE-MEDICATION IN DENTISTRY FOR CHILDREN

Manuel M. Album. J. Den. Children 24:215 Fourth Quarter 1957.

Some children seen in dental offices present problems which label them as impossible patients. These individuals need special attention, and if conditions warrant, premedication or general anesthesia may be necessary to render successful dental treatment.

A number of drugs may be used to give the desired relaxation and sedation; however, a thorough understanding of the medication's pharmacologic and physiologic properties is necessary by the operator. One of the barbiturates, such as pentobarbital, secobarbital, or meperidine is indicated to give complete sedation. Excellent results may be obtained with premedication; but children, because of their basal metabolic rate, require more sedation than adults. Tables are included giving factors which influence a correct dosage and reasons why sometimes poor results are obtained. Idiosyncrasies to the barbiturates are rare, but a word of caution should be given to the parents about care of the child who has had premedication.

In instances where it is impossible to perform dental treatment for the child even with the use of premedication, the child should be hospitalized and the dental work done under general anesthesia. This would be true of both the normal and the handicapped child. Complete operative dentistry carried out while working under a prescribed hospital technic will serve several purposes. The child's and parents' faith in the dentist will be restored, the number of visits will be reduced to one, and usually the child is a much better dental patient later.

Different general anesthetic agents may be used to achieve the desired effects; however the technic is only as safe as the skill of the anesthesiologist and his knowledge of the anesthesia. This report deals with the procedure used at Children's Hospital in Philadelphia, and the drugs employed are trichloroethylene in combination with nitrous oxide and oxygen administered orotracheally and the use of succinyl chlorine as a muscle-relaxing agent.

A general physical examination by the hospital staff is the most important aspect of general anesthesia. Preoperative sedation is given about an hour before the operative procedure. A table with the drugs and their dosage for the premedication is included. Patients are retained in the hospital a minimum of time, but usually not more than one night.

With the aid of premedication and general anesthesia, there is no such thing as an untreatable child.

John Sanders Pike

A SOLUTION TO THE PROBLEM OF THE LOWER BILATERAL FREE-END SADDLE PARTIAL DENTURE

John E. Ackerman, and A. Boehm. J. Canad. D.A. 24:74 Feb. 1958.

Partial dentures presently are designed much as they were 30 years ago. Trauma is responsible for the early loss of the abutment teeth when bilateral free-end saddles are used. To a certain extent splinting of several teeth has guarded against such an early loss. "Regular" relinings of the saddles to compensate for the resorption of tissues would also lessen the stresses on the abutment teeth. Clinically this is often done, however, when the abutment teeth already have been damaged.

The "settling syndrome" in a partial denture exhibits several objective symptoms: (1) the abutment teeth are loose and tender to pressure; (2) the gingival tissues around the abutment teeth are inflamed where the denture is in contact and buccal and lingual peripheries cause sore spots; (3) inflamed gingiva results from pressure of the bar, and (4) the anterior teeth are in traumatic occlusion which results in chipping of the upper denture teeth and tipping of the upper denture.

Stress-breakers have been used with bilateral free-end saddle dentures to prevent these conditions. Most of these are failures in one way or another and little space has been allotted to them in most textbooks.

The solution lies in designing the partial denture so that the saddles are controlled under mastication and are free to move toward the tissue and return to their rest position. It is desirable to distribute the greater force of mastication over many of the remaining teeth and not to overload any single tooth. In this way the prosthesis is designed biologically and mechanically. Illustrations describe a successful solution. The design makes use of double lingual bars, slides which control distal, occlusal, labial and lingual movements, and

round wire springs to distribute the pressure evenly. The advantages of such a design are that no single tooth is overloaded, the resorption of the alveolar ridge is reduced to a minimum, maintenance required for the appliance is reduced, the laboratory cost is not significantly increased, and movements of the denture during mastication are controlled.

H. O. Beck

FACTS ABOUT FAINTING

Harold J. Hoxie. Life & Health 73:12 March 1958.

Any patient may faint at the dental or medical office. Fainting is not necessarily a sign that the patient is weak or in a delicate condition. In fact, the most common type of fainting occurs in patients with normal hearts and healthy circulatory systems.

Fainting is a sudden, unexpected, transitory loss of consciousness. The patient may be warned of the onset of fainting by lightheadedness and a sinking, weak or nauseated feeling in his stomach region. Dentists or physicians who see him notice that he is becoming pale and losing interest in things around him. His pulse is weak, his breathing is shallow and his skin is cool. If his head is lowered to the level of his body, he soon regains consciousness but he may remain pale for several minutes.

Fainting is caused by a sudden decrease of the blood flow to the brain. The brain cannot function properly without a constant supply of blood. If the pressure in the patient's arteries drops below 50 mm. of mercury for a few seconds, the patient will faint. If the fall in pressure is less severe, the patient may feel merely lightheaded. If the fall in pressure is prolonged and the body is kept in an upright position, the patient may suffer serious brain injury and may die.

Knowledge of the circulatory system will help the dentist to understand the various causes of fainting.

The taking of nerve-blocking drugs may cause a patient to faint. Compression of the carotid artery behind the angle of the jaw may cause temporary cessation of the heartbeat and sudden fall in blood pressure resulting in fainting.

Fainting is not serious. The patient frequently recovers as soon as he is laid flat. The danger in fainting lies in the circumstances under which it occurs: the seriousness of fainting in patients with heart disease depends on the severity of the heart disease.

Unless the cause of fainting is obvious, the patient who faints should have a thorough medical examination to determine the cause and to outline preventive procedures.

Here are some simple preventive measures against fainting. On hot days, the patient should not remain long in one position. If he is subject to fainting, he should lie down when he is vaccinated or given an injection.

If a patient faints or feels faint at the dental or the medical office, he should be helped immediately to a horizontal position. If this is impossible, the head should be lowered to the level of the knees. All tight clothing should be loosened. Unless the patient is seriously ill, these measures will help him regain consciousness within a few moments.

ANTE-NATAL DENTAL ADVISORY SERVICE

Isobel R. Presland and C. M. Littlejohn. New Zealand D.J. 54:19 Jan. 1958.

In 1951 the departments of preventive medicine and preventive dentistry at the University of Otago established a dental examination and advisory service at the Queen Mary Ante-Natal Clinic in Dunedin. The service includes dental diagnosis and instruction to expectant mothers on the care of their mouths and on the dental needs of infants and preschool children. A dental survey of 284 women aged 14 to 44 years in 1951 was repeated in 1956 on a group of similar size and composition.

Both surveys showed that the numbers wearing dentures increased with age. There is only a slight increase in the caries attack rate as indicated by the DMF index from 16 to 40 years of age. The well-known relation between the incidence of periodontal disease and the presence of calculus was confirmed.

The percentage of women of all ages wearing some form of dental prosthesis declined from 58 per cent in 1951 to 46 per cent in 1956. This decline was most apparent in women in the age group from 16 to 20 years; in 1951 in this group, 42 per cent were wearing some form of prosthesis, whereas in 1956 the proportion was only 24 per cent.

The general standard of oral hygiene was better in 1956 than in 1951. The substantial reduction in the proportion of women wearing dentures in 1956 suggests that those in the 1956 group were more convinced of the importance of retaining their natural teeth and therefore sought regular conservative treatment and improved the standard of their oral hygiene.

Observation has convinced the authors that the existence of the dental service at Queen Mary Hospital creates an interest in dental health not only in the patients but in the medical and nursing staff.

Deaths

Pagenkopf, Alfred A., St. Paul; University of Minnesota School of Dentistry, 1909; died March 12; age 70.

Peachey, Robert I., Paso Robles, Calif.; University of California College of Dentistry, 1927; died April 1; age 62.

Pearse, John L., Ontonagon, Mich.; University of Michigan School of Dentistry, 1930; died May 9; age 54.

Pearsey, Horace W., Rushville, Ind.; Indiana University School of Dentistry, 1927; died April 23; age 55.

Peterson, Chris P., Mankato, Minn.; Keokuk Dental College, 1903; died May 12; age 91.

Phelps, William D., Cambridge, Mass.; died May 13; age 80.

Phillips, Edwin D., South Euclid, Ohio; Western Reserve University School of Dentistry, 1905; died May 23; age 76.

Powell, Kenneth W., Los Angeles; University of Southern California School of Dentistry, 1924; died April 16; age 58.

Powers, Campbell W., Daytona Beach, Fla.; Philadelphia Dental College, 1898; died April 6; age 83.

Quitt, William, Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1908; died January 25; age 72.

Ranck, Cyrus S., Davenport, Iowa; University of Iowa College of Dentistry, 1917; died May 22; age 64.

Reese, Wallace K., Jr., Denison, Texas; University of Louisville School of Dentistry, 1940; died May 8; age 42.

Ridley, Sylvester R., Oak Park, Ill.; Chicago College of Dental Surgery, 1907; died March 15; age 80.

Rink, Clark W., Indiana, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1897; died November 3; age 87.

Rist, Alfred L., Algona, Iowa; University of Iowa College of Dentistry, 1888; died February 7; age 91.

Rockefeller, Melvin O., Miami, Fla.; died December 26; age 73.

Rose, Henry L., Sheboygan, Wis.; Marquette University Dental School, 1912; died January 6; age 71.

Rose, William A., Scranton, Pa.; Temple University School of Dentistry, 1922; died May 8; age 58.

Ross, Theophilus N., Jr., Jackson, Miss.; Loyola University School of Dentistry, New Orleans, La., 1955; died May 3; age 30.

Roth, Melvin J., Colfax, Ind.; Indiana Dental College, 1908; died May 20; age 76.

Rutledge, Haddock E., Pineville, La.; Atlanta-Southern Dental College, 1925; died April 9; age 54.

Saunders, William H., Council Bluffs, Iowa; Creighton University College of Dentistry, 1913; died January 2; age 74.

Scheifley, William J., Harrisburg, Pa.; Temple University School of Dentistry, 1913; died March 19; age 65.

Schlueter, Edward H., Manchester, Mo.; Washington University School of Dentistry, St. Louis, 1929; died March 10; age 50.

Schwartzman, Walter, Branford, Conn.; Temple University School of Dentistry, 1937; died May 25; age 45.

Schycker, Carl, Chicago; Chicago College of Dental Surgery, 1892; died March 10; age 95.

Scroggin, Guy Thomas, San Antonio, Texas; Northwestern University Dental School, 1923; died October 7; age 67.

Seaborg, John W., Chicago; Northwestern University Dental School, 1913; died April 20; age 66.

Sebolt, Frank B., Chicago; Chicago College of Dental Surgery, 1908; died November 1; age 76.

Segal, Abraham, New York; Baltimore College of Dental Surgery, University of Maryland, 1913; died November 1; age 68.

Sexton, Lee V., Miami, Fla.; Southern Dental College, 1917; died April 29; age 63.

Shakely, Samuel F., Greenville, Pa.; Ohio College of Dental Surgery, University of Cincinnati, 1905; died January 14; age 81.

Sheehan, Joseph A., Callensburg, Pa.; University of Pennsylvania School of Dentistry, 1902; died February 12; age 83.

Sherman, William G., Riviera Beach, Fla.; Baltimore College of Dental Surgery, University of Maryland, 1912; died January 21; age 67.

Shiell, Lewis S., Beverly Hills, Calif.; University of Southern California School of Dentistry, 1931; died January 31; age 49.

Shoop, Wilmer L., Mount Joy, Pa.; University of Pittsburgh School of Dentistry, 1927; died April 19; age 63.

Shrewsbury, Charles W., Montgomery W. Va.; died April 18; age 66.

Sigler, Raymond G., Pinckney, Mich; University of Michigan School of Dentistry, 1909; died December; age 73.

Simons, Lawrence W., Earl Park, Ind.; Indiana University School of Dentistry, 1934; died May 16; age 47.

Simpson, James A., Oradell, N. J.; University of Toronto Faculty of Dentistry, Toronto, Ontario, Canada, 1896; died June 9; age 83.

Slack, Albert D., St. Louis; St. Louis University School of Dentistry, 1924; died January 9; age 56.

Smith, Augustus C., Eatontown, N. J.; New York College of Dentistry, 1903; died February 5; age 79.

Smith, Daniel P., Nashville, Tenn.; Meharry Medical College School of Dentistry, 1914; died December 31; age 72.

Smith, David H., North Bergen, N. J.; College of Jersey City Department of Dentistry, 1917; died May 16; age 62.

Smith, Eva C., Middletown, Ohio; University of Michigan School of Dentistry, 1887; died February 16; age 93.

Smith, Herman L., Trumansburg, N. Y.; Western Reserve University School of Dentistry, 1903; died March 17; age 81.

Smith, Solomon I., Westchester, Ill.; University of Illinois College of Dentistry, 1939; died April 8; age 41.

Smith, William E., Portland, Ore.; North Pacific College of Oregon School of Dentistry, Portland, 1909; died January 28; age 74.

Solley, Albert A., San Francisco; University of California College of Dentistry, 1903; died April 24; age 77.

Solliday, A. F., Watertown, Wis.; Chicago College of Dental Surgery, 1895; died May 10; age 86.

Solomon, Lewis M., Memphis, Tenn.; University of Tennessee College of Dentistry, 1924; died April 6; age 54.

Spencer, Philip G., Chicago; Northwestern University Dental School, 1924; died May 15; age 55.

Springmann, Albert L., Union City, N. J.; died January 19.

Srigley, John H., Athens, Ohio; Ohio State University College of Dentistry, 1938; died March 11; age 50.

Starke, George G., Amenia, N. Y.; New York College of Dentistry, 1909; died December 29; age 71.

Steel, Edward H., Robinson, Ill.; Chicago College of Dental Surgery, 1899; died February 10; age 85.

Stewart, Harry Joshua, Canisteo, N. Y.; University of Buffalo School of Dentistry, 1901; died April 9; age 81.

Stewart, Royal H., Waco, Texas; Vanderbilt University School of Dentistry, 1907; died March 18; age 71.

Stine, Charles A., Baltimore; University of Maryland Dental Department, Baltimore, 1923; died February 17; age 59.

Stow, Reginald H., Hazardville, Conn.; University of Pennsylvania School of Dentistry, 1908; died April 25; age 74.

Strangways, William H., Euclid, Ohio; Philadelphia Dental College, 1901; died January 4; age 78.

Strasser, John E., Los Angeles; Pittsburgh Dental College Western University of Pennsylvania, 1900; died March 30; age 85.

Strenkert, Arthur C., Leonia, N. J.; University of Pennsylvania School of Dentistry, 1918; died May 22; age 66.

Strong, Lawrence L., Peoria, Ill.; Northwestern University Dental School, 1923; died April 7; age 59.

Strong, William H., Boston; died April 22, 1957; age 68.

Strub, Charles H., Arcadia, Calif.; University of California College of Dentistry, 1906; died March 28; age 73.

Stryker, George W., Hollywood, Calif.; Tacoma College of Dental Surgery, 1898; died February 22; age 89.

Sumner, David W., Gering, Neb.; Lincoln Dental College of Cotner University, 1910; died April 17; age 73.

Swanson, Donald L., Joliet, Ill.; University of Illinois College of Dentistry, 1952; died January 3; age 34.

Swartz, Lytton M., Long Beach, Calif.; University of Southern California School of Dentistry, 1929; died June 2; age 59.

Swing, Charles H., Jr., Appomattox, Va.; Medical College of Virginia School of Dentistry, 1933; died January 21; age 48.

Talbert, John A., Shreveport, La.; Atlanta Dental College, 1908; died April 3; age 76.

Tannehill, Charles H., Muskegon, Mich.; University of Michigan School of Dentistry, 1901; died March 20; age 78.

Tannehill, George L., Minerva, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1913; died March 28; age 67.

Taylor, Edward, San Antonio, Texas; State Dental College, Dallas, 1917; died March 15; age 66.

Taylor, John T., Rock Island, Ill.; died March 29; age 85.

Thaxton, O. C., Pratt City, Ala.; Birmingham Dental College, 1908; died March 7; age 79.

Thompson, Charles H., Chicago; Meharry Medical College School of Dentistry, 1923; died February 23; age 78.

Thompson, Dennis R., Paris, Ark.; Vanderbilt University School of Dentistry, 1909; died June 10; age 74.

Thompson, James M., Tucson, Ariz.; Philadelphia Dental College, 1892; died May 26; age 88.

Thompson, Howard C., Detroit; University of Michigan School of Dentistry, 1930; died March 20; age 50.

Tobias, Alexander, Brooklyn; New York College of Dentistry, 1919; died April 2; age 61.

Tortorella, Nick J., Elizabeth, N. J.; Texas Dental College, 1931; died May 23; age 54.

Tower, Elbert J., Cedar Springs, Mich.; University of Michigan School of Dentistry, 1900; died February 27; age 80.

Trimmer, Edwin D., High Bridge, N. J.; Pennsylvania College of Dental Surgery, 1899; died April 28; age 85.

Turner, Reuben C., Jr., Caldwell, Kan.; died March 5; age 70.

Turner, Wilfred A., Fall River, Mass.; University of Maryland Dental Department, 1913; died January 19; age 73.

Tyler, John H., Austin, Texas; Baylor University College of Dentistry, 1930; died October 25; age 52.

Ulrich, George R., Jenkintown, Pa.; University of Pennsylvania School of Dentistry, 1891; died January 23; age 96.

Updyke, Robert Patten, Los Angeles; University of Minnesota School of Dentistry, 1899; died April 23; age 79.

Uppendahl, Frank H., Peoria, Ill.; Chicago College of Dental Surgery, 1907; died March 13; age 72.

Vader, Melvin M., Eau Claire, Wis.; Marquette University Dental School, 1926; died April 24; age 59.

Vandenburgh, Charles M., Milwaukee; Milwaukee Medical College Dental Department, 1899; died March 20; age 78.

Van Duine, Harold A., West Point Pleasant, N. J.; University of Pennsylvania School of Dentistry, 1920; died April 14; age 60.

Vander Linden, William H., Hickory, N. C.; Atlanta Dental College, 1911; died May 2; age 68.

Vander Volgen, Edgar C., Crawfordsville, Ind.; Indiana Dental College, 1904; died February 24; age 80.

Vlassis, Nicholas, Detroit; Indiana University School of Dentistry, 1928; died March 13; age 60.

Voorhies, Herbert D., Kansas City, Mo.; Meharry Medical College School of Dentistry, 1912; died April 28; age 72.

Waggoner, Rex R., North Hollywood, Calif.; University of Southern California, School of Dentistry, 1930; died April 3; age 50.

Waldman, Milton B., Freeport, N. Y.; Columbia University School of Dental and Oral Surgery, 1923; died June 5; age 61.

Wansley, Reuben A., Houston, Texas; Texas Dental College, 1914; died March 19; age 67.

Ward, Kenwyn F., North East, Pa.; University of Pittsburgh School of Dentistry, 1952; died May 14; age 36.

Washington, Richard W., Austin, Texas; Meharry Medical College School of Dentistry, 1954; died January 15; age 30.

Watson, James, Cameron, Texas; Vanderbilt University School of Dentistry, 1907; died January 20; age 83.

Werts, Clarence B., Ladoga, Ind.; Western Dental College, 1900; died April 15; age 88.

Wessner, George A., Ridgewood, N. J.; University of Pennsylvania School of Dentistry, 1909; died November 30; age 73.

Whalen, Harold J., Rochester, N. Y.; McGill University Faculty of Dentistry, Montreal, Quebec, Canada, 1930; died April 16; age 59.

Wilkie, Douglas L., Havre, Mont.; Northwestern University Dental School, 1936; died May 21; age 45.

Wilkin, Charles O., Newburgh, N. Y.; Philadelphia Dental College, 1898; died May 25; age 83.

Wilkinson, Lynn C., Milwaukee; University of Illinois College of Dentistry, 1930; died March 14; age 52.

Williams, Curtis W., Shreveport, La.; Atlanta-Southern Dental College, 1919; died April 3; age 62.

Williamson, Rayner, Miami Springs, Fla.; Atlanta-Southern Dental College, 1929; died April 3; age 59.

Wilson, John H., Salt Lake City; University of Pennsylvania School of Dentistry, 1919; died April 28; age 62.

Wilson, Otto B., Oklahoma City, Okla.; Kansas City Dental College; died March 12; age 60.

Wilson, William P., Birmingham, Ala.; Birmingham Dental College, 1900; died April 16; age 83.

Wolfe, Franklin D., Fresno, Calif.; Vanderbilt University School of Dentistry, 1901; died May 17; age 84.

Woods, Wendell D., Woodstock, Vt.; University of Nebraska College of Dentistry, 1932; died April 3; age 49.

Woolwine, Roy V., Fort Worth, Texas; Western Dental College, 1904; died April 25; age 76.

Wright, Thomas J., Pasadena, Calif.; died May 24; age 61.

Zonn, Saul J., Hyde Park, Mass.; Tufts College Dental School, 1918; died February 9; age 76.

Zukowski, Antone L., La Salle, Ill.; Northwestern University Dental School, 1931; died April 18; age 50.

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Public Health Dentistry: David F. Striffler, State Health Department, P.O. Box 711, Santa Fe, N. Mex.

Research: David B. Scott, National Institute of Dental Research, Bethesda 14, Md.

Roentgenology: Arthur H. Wuehrmann, School of Dentistry, University of Alabama, Birmingham, Ala.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

222 East Superior Street, Chicago 11, Illinois

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All expressions of opinion and statements of supposed fact are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. Articles are accepted with the understanding that they have not been published previously and that they are submitted solely to The Journal. The Journal of the American Dental Association is indexed in the Index to Dental Literature, in the Current List of Medical Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Ninth Annual Session	November 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	September 14-18, 1959	New York
One-Hundred and First Annual Session	October 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	October 16-19, 1961	Philadelphia

MEETINGS OF CONSTITUENT SOCIETIES

State	*Date*	*Place*	*Secretary and Address*
Alabama	Apr. 19-22	Birmingham	C. R. Crook, Professional Center, Montgomery
Alaska	July 13-15	Anchorage	C. L. Polley, Box 1896, Juneau
Arizona	May 6-9	Scottsdale	W. G. Burke, 15 E. Monroe St., Phoenix
Arkansas	Apr. 12-15	Little Rock	D. M. Hamm, Box 89, Clarksville
California	Apr. 20-22	San Francisco	W. J. Healy, 518 Sutter St., San Francisco 8
S. California	May 4-6	Los Angeles	S. M. Silverman, 903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 5-8	Colorado Springs	G. H. Jackson, 724 Republic Bldg., Denver
Connecticut	May 13, 14	Hartford	E. S. Arnold, 37 Linnard Rd., W. Hartford
Delaware			E. J. Truono, 1102 S. Broom St., Wilmington 4
Dist. of Columbia	Mar. 15-18	Washington	J. F. Keaveny, 1835 Eye St., N.W., Washington 6
Florida	May 17-20	Hollywood	R. P. Groom, 3127 Atlantic Blvd., Jacksonville
Georgia	Oct. 12-15	Atlanta	F. M. Butler, Jr., Bankers Insurance Bldg., Macon
Hawaii	June 14-18	Honolulu	J. H. Dawe, 810 N. Vineyard St., Honolulu
Idaho	June 22-24	McCall	J. R. Olesberg, 214 Third St., Coeur d'Alene
Illinois	May 11-13	Peoria	P. W. Clopper, 632 Jefferson Bldg., Peoria
Indiana	May 18-20	Indianapolis	W. R. Shoemaker, Citizens Bank Bldg., Anderson
Iowa	May 3-6		H. N. Hake, 639 Insurance Exchange Bldg., Des Moines
Kansas	Apr. 26-29	Topeka	F. A. Richmond, Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 5-8	Louisville	A. B. Coxwell, Jr., 2208 Dundee Rd., Louisville 5
Louisiana	Apr. 1-4	Shreveport	J. S. Bernhard, 2515 Line Ave., Shreveport
Maine	June 18-20	Rockland	S. M. Gower, Box 27, Skowhegan
Maryland	May 3-6	Baltimore	C. L. Inman, Jr., Medical Arts Bldg., Baltimore
Massachusetts	May 3-6	Boston	H. E. Tingley, 12 Bay State Rd., Boston 15
Michigan	Apr. 20-22	Grand Rapids	F. Wertheimer, Michigan Dept. of Health, Lansing
Minnesota	Apr. 13-15	Minneapolis	C. V. E. Cassel, 2236 Marshall Ave., St. Paul 4
Mississippi			B. A. Cohen, Box 9981, Jackson 27
Missouri	May 10-13	Springfield	E. D. Suggett, Merchants Bank Bldg., Jefferson City
Montana	May 7-9	Kalispell	R. C. Ritter, 28 N. Black St., Bozeman
Nebraska	Apr. 26-29	Lincoln	F. A. Pierson, Federal Securities Bldg., Lincoln
Nevada	May 10-12	Las Vegas	O. M. Seifert, 755 Ryland Ave., Reno
New Hampshire	June 21-24	Whitefield	F. E. Williams, 814 Elm St., Manchester
New Jersey	May 12-15	Atlantic City	J. G. Carr, 407 Cooper St., Camden

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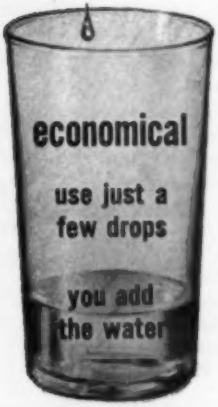

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State	*Date*	*Place*	*Secretary and Address*
New Mexico	June 7-10	Santa Fe	W. A. Blueher, 24 Medical Arts Sq., N. E., Albuquerque
New York	May 10-13	Syracuse	C. A. Wilkie, 1 Hanson Pl., Brooklyn 17
North Carolina	May 3-6	Pinehurst	L. H. Butler, Jefferson Bldg., Greensboro
North Dakota	May 3-6	Grand Forks	J. H. Pfister, 419½ Dakota Ave., Wahpeton
Ohio	Sept. 28-Oct. 1	Cincinnati	E. G. Jones, 185 E. State St., Columbus
Oklahoma	Apr. 26-29	Tulsa	L. D. Wright, Osler Bldg., Oklahoma City
Oregon	Mar. 2-4	Portland	T. D. Holder, Selling Bldg., Portland
Panama C. Z.			G. E. Lilly, Box 29, Ft. Clayton
Pennsylvania	May 13-16	Harrisburg	M. D. Zimmerman, 217 State St., Harrisburg
Puerto Rico	Jan.	San Juan	J. E. Munoz, Box 9023, Santurce
Rhode Island	Jan. 20, 21	Providence	H. A. McGuirl, Union Trust Bldg., Providence
South Carolina	May 24-26	Charleston	J. E. Wallace, 1506 Gregg St., Columbia
South Dakota	May 31-June 2	Rapid City	R. E. Decker, Box 308, Parker
Tennessee	May 11, 14	Nashville	K. P. Ezell, 116 N. Academy, Murfreesboro
Texas	May 3-6	San Antonio	C. A. McMurray, 3707 Gaston Ave., Dallas 10
Utah			R. C. Dalgleish, State Capitol Bldg., Salt Lake City
Vermont			E. C. Woods, 36 Washington St., Rutland
Virginia	Apr. 8-11	Roanoke	W. T. McAfee, Colonial National Bank Bldg., Roanoke
Washington	Apr. 6-8	Seattle	G. D. Dore, Jr., 211 Medical Dental Bldg., Seattle 1
West Virginia			G. N. Casto, Jr., 710½ Lee St., Charleston
Wisconsin	Apr. 27-29	Milwaukee	C. J. Baumann, Jr., 606 W. Wisconsin Ave., Milwaukee
Wyoming			T. J. Drew, State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	*Date*	*Place*	*Secretary and Address*
Alabama	June 21-27‡		W. L. Smith, 524 Chestnut St., Gadsden
Alaska	July 7-10*†	Anchorage	R. H. Williams, Box 2122, Juneau
Arizona	June 15‡		W. G. Biddulph, 1611 N. Second Ave., Glendale
Arkansas	June 15-19	Little Rock	G. Cone, 113 S. Pecan St., Osceola
California	Feb. 2	Los Angeles	D. R. Grant, 507 Polk St., San Francisco
	June 22	Los Angeles	
	July 27	San Francisco	
	August 31	San Francisco	
Colorado			R. F. Gilmore, Republic Bldg., Denver 2
Connecticut			C. G. Brooks, 302 State St., New London
Delaware			J. F. Maguire, 1200 N. Van Buren St., Wilmington
Dist. of Columbia			W. T. Birthright, 1835 Eye St., N.W., Washington
Florida	July 5-16*‡ July 6, 7†‡		R. P. Taylor, Jr., P. O. Box 2913, Jacksonville 3
Georgia	June 8-10*†	Atlanta	W. G. Brown, Blackshear
Hawaii			J. Y. Ing, James Campbell Bldg., Honolulu
Idaho			W. M. Smith, 305 Fort St., Boise
Illinois			W. A. McKee, Wood Bldg., Benton
Indiana	Dec. 8-11*†	Indianapolis	C. A. Frech, Gray National Bank Bldg., Gary
Iowa	June 1-5*†	Iowa City	P. A. Hahn, Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall, Box 71, Hiawatha
Kentucky			J. J. Kelly, 102 W. Madison St., Franklin
Louisiana			R. C. Steib, Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby, Box 260, Skowhegan
Maryland			W. D. Burton, 829 Park Ave., Baltimore 1
Massachusetts			C. R. Williams, 70 Washington St., Salem

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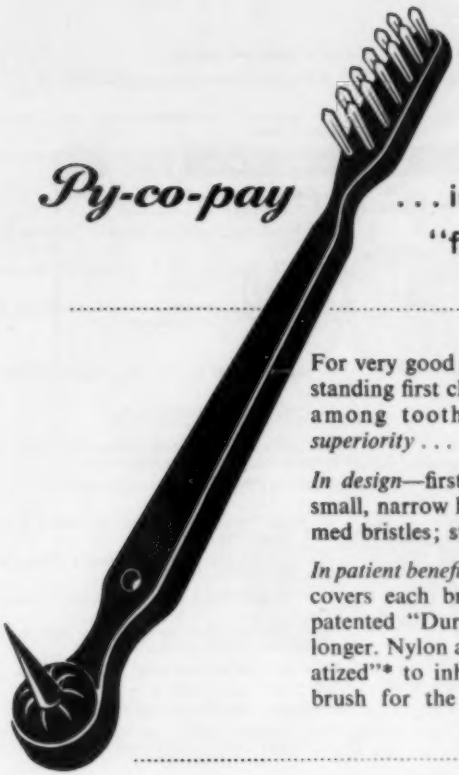
State	*Date*	*Place*	*Secretary and Address*
Michigan	Jan. 18-24 June 7-13*†	Ann Arbor	J. L. Champagne, 3714 McNichols Rd., Detroit 21
Minnesota			E. A. Nelson, 2236 Marshall Ave., St. Paul 4 W
Mississippi	Jan. 5-7*†‡		A. H. Richter, Jr., Aven Bldg., Greenwood
Missouri	Oct. 9-11, 13, 14	St. Louis	R. R. Rhoades, Central Trust Bldg., Jefferson City
Montana			R. O. Betzner, 303 Power Block, Helena
Nebraska			H. E. Weber, Stuart Bldg., Lincoln
Nevada	Dec. 7	Reno	R. Whitehead, 40 W. First St., Reno
New Hampshire			S. G. Markos, 8 Renaud Ave., Dover
New Jersey	Dec. 1, 2* Dec. 3* Dec. 2†	Philadelphia Trenton Philadelphia	C. J. Schweikhardt, 150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr., Artesia
New York	Dec. 2-5, 8, 9*‡		D. W. Beier, 23 S. Pearl St., Albany 7
North Carolina			J. H. Guion, Doctors Bldg., Charlotte 7
North Dakota	July 13-17	Fargo	G. F. Wirtz, Clinic Bldg., Mandan
Ohio	Oct. 2-4* Oct. 3† Oct. 6, 7	Columbus	D. E. Bowers, 322 E. State St., Columbus 15
Oklahoma			W. H. Stephens, Plaza Court Bldg., Oklahoma City
Oregon	Dec. 8-11*†	Portland	F. L. Utter, Pioneer Trust Bldg., Salem
Pennsylvania			P. Swanson, 8111 Jenkins Arcade, Pittsburgh
Puerto Rico			J. Mercado C., Comercio St. #452, San Juan
Rhode Island			F. M. Hackett, 267 Academy Ave., Providence
South Carolina			W. J. Brockington, 1508 Washington St., Columbia 1
South Dakota			H. T. Aker, Canton
Tennessee	Dec. 15‡		C. R. Aita, Bennie-Dillon Bldg., Nashville
Texas	Oct. 8-12* Oct. 10-12†	Houston	R. T. Weber, Capital National Bank Bldg., Austin 16
Utah	June 22-27‡		R. W. Fishburn, 4 Professional Center, Brigham City
Vermont	June 22-24‡		P. M. Fitch, Newport
Virginia	June 8-13* June 10, 11†	Richmond	J. M. Hughes, Medical Arts Bldg., Richmond
Washington			F. S. Rotchford, 1108 S. Washington St., Olympia
West Virginia			C. C. Cottrill, Box 111, Glen Rogers
Wisconsin			S. F. Donovan, Tomah
Wyoming			E. E. Edwards, Bank of Commerce Bldg., Sheridan

**Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. Most states require applications to be in 30 days prior to examination date.*

MEETINGS OF OTHER ORGANIZATIONS

Name	*Date*	*Place*	*Secy. or Chm. and Address*
Academy of Dentistry for the Handicapped	Feb. 8	Chicago	R. Kaplan, 3038 Federal St., Camden, N.J.
All India Dental Conference (Twenty-fourth)	Feb. 19	Bangalore	R. S. Padmanabhan, 29 Vanivilas Road, Basavangudi, Bangalore 4, India
American Academy of Crown and Bridge Prosthodontics	Feb. 7, 8	Chicago	W. E. Corry, 2165 Adelbert Rd., Cleveland 6
American Academy of Dental Medicine	Dec. 7	New York	W. I. Levine, 809 Cathedral St., Baltimore, Md.
American Academy of Dental Practice Administration	Feb. 5, 6	Chicago	R. H. Campbell, 18595 Grand River Ave., Detroit 23
American Academy of Gold Foil Operators	Nov. 7, 8	Dallas	C. C. Latham, 1125 Tenth St., Coronado, Calif.
American Academy of the History of Dentistry	Nov. 7	Dallas	M. B. Asbell, 25 Haddon Ave., Camden, N. J.



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Name	*Date*	*Place*	*Secy. or Chm. and Address*
American Academy of Implant Dentures	Nov. 7-9	Dallas	A. N. Cranin, 2120 Ocean Ave., Brooklyn 29
American Academy of Maxillofacial Prosthetics	Feb. 4-6	Chicago	H. C. Sullivan, 1516 Wealthy St., S.E., Grand Rapids 6, Mich.
American Academy of Oral Pathology	Apr. 17-19	Minneapolis	R. J. Gorlin, School of Dentistry, University of Minnesota, Minneapolis 14
American Academy of Oral Roentgenology	Nov. 7, 8	Dallas	T. S. Grant, 508 16th St., Oakland, Calif.
American Academy of Periodontology	Nov. 6-8	Dallas	C. E. Chamberlain, 1101 N. North St., Peoria, Ill.
American Academy of Restorative Dentistry	Feb. 7, 8	Chicago	M. H. Mortonson, Jr., 735 N. Water St.,[1] Milwaukee 2
American Association for the Advancement of Science, Section on Dentistry	Dec. 29	Washington, D.C.	R. W. Bunting, University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Association of Dental Editors	Nov. 8	Dallas	A. H. Kutscher, 400 N. 8th Ave., Highland Park, N. J.
American Association of Dental Examiners	Nov. 7, 8	Dallas	G. L. Teall, Box 71, Hiawatha, Kan.
American Association of Dental Schools	Nov. 9	Dallas	M. W. McCrea, School of Dentistry, University of Minnesota, 127 Owre Hall, Minneapolis
American Association of Endodontists	Feb. 6-8	Chicago	V. B. Milas, 2559 W. 63rd St., Chicago 29
American Association of Industrial Dentists	Apr.	Chicago	E. R. Aston, Pennsylvania Dept. of Health, P.O. Box 90, Harrisburg, Pa.
American Association of Public Health Dentists	Nov. 8	Dallas	P. Ayres, Box 2591, Jefferson County Dept. of Health, Birmingham, Ala.
American Board of Dental Public Health	Nov. 6, 7	Dallas	C. V. Tossy, Michigan Dept. of Health, Lansing, Mich.
American Board of Oral Pathology	Dec. 6, 7		D. A. Kerr, University of Michigan, School of Dentistry, Ann Arbor, Mich.
American Board of Oral Surgery	Dec. 1 Apr. 2-6	Chicago Chicago	L. M. FitzGerald, Roshek Bldg., Dubuque, Iowa
American College of Dentists	Nov. 9	Dallas	O. W. Brandhorst, 4221 Lindell Blvd., St. Louis
American Dental Assistants Association	Nov. 10-13	Dallas	M. L. Martin, First National Bank Bldg., La Porte Ind.
American Dental Assistants Certification Board	Oct. 8		F. Smith, 23 W. 33 St., Bayonne, N.J.
American Dental Hygienists' Association	Nov. 10-13	Dallas	M. E. Swanson, 100 E. Ohio St., Chicago
American Dental Society of Anesthesiology	Nov. 8, 9	Dallas	H. A. Sultz, 249 Linwood Ave., Buffalo
American Denture Society	Nov. 7, 8	Dallas	V. L. Steffel, College of Dentistry, Ohio State University, Columbus, Ohio
American Institute of Dental Medicine	Oct. 12-16	Palm Springs, Calif.	M. Lewis, 2240 Channing Way, Berkeley 4, Calif.
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 27	New York	M. H. Feldman, 730 Fifth Ave., New York 19
American Society of Dentistry for Children	Nov. 7-9	Dallas	R. E. McDonald, School of Dentistry, Indiana University, 1121 W. Michigan St., Indianapolis
Armed Forces Reserve Dental Officers' Association	Nov. 9	Dallas	D. Lewis, 11601 Viers Mill Rd., Wheaton, Md.
Association of American Women Dentists	Nov. 10	Dallas	M. B. McCann, 2600 N. McCullough, San Antonio Texas
Australian Dental Congress (Fifteenth)	Feb. 23-27	Adelaide, So. Australia	M. J. Barrett, 51 Grenfell St., Adelaide, So. Australia
Canadian Dental Association	Oct. 26-29	Montreal	D. W. Gullett, 234 St. George St., Toronto 5, Canada
Chicago Dental Society	Feb. 8-11	Chicago	K. S. Richardson, 30 N. Michigan Ave., Chicago
Council on Dental Education, Dental Aptitude Tests	Oct. 3, 4		S. Peterson, 222 E. Superior St., Chicago 11
Cuban National Dental Congress (Fifth)	Mar. 29-31	Havana	C. Funcia C., No. 353, Vedado, Havana, Cuba

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Fig. 1

A pontic must restore function, be hygienic, meet esthetic demands, and it must be bioligically acceptable to oral tissues. To fulfill these requirements some changes from normal tooth form (shown in Fig. 1) are necessary.

Fig. 2

Fig. 2 shows a 3 unit bridge. Narrowing the bucco-lingual width of the occlusal surface reduces the area exposed to masticatory forces. The lingual embrasures are widened to facilitate self-cleansing action and easier patient care.

Fig. 3

Fig. 3 shows a 4 unit bridge. When lengthening the span, the occlusal surfaces are reduced still further. Both short and long span bridges have supplementary occlusal grooves and lingual spillways to prevent the packing of food in the occlusal fossae.

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NEY-ORO
A-1 inlays
B-2 bridges
C-3 partials

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Name	*Date*	*Place*	*Secy. or Chm. and Address*
Dallas Mid-Winter Dental Clinic (Thirty-second)	Jan. 25-28	Dallas, Texas	M. Thornton, 2921 Fairmount, Dallas, Texas
Denver Dental Association	Jan. 11-14	Denver	W. D. McCarthy, Republic Bldg., Denver 2
Detroit District Dental Society	Nov. 24, 25	Detroit	S. Silverman, 6426 Van Dyke Ave., Detroit 13
Greater New York Dental Meeting (Thirty-fourth)	Dec. 8-12	New York	M. Purdy, Statler Hotel, New York 1
Greater Philadelphia	Mar. 3-6	Philadelphia	M. Kohn, Sheraton Hotel, 17th St. and Pennsylvania Blvd., Philadelphia 3
International Association for Dental Research	Mar. 19-22	San Francisco	D. Y. Burrill, Northwestern University, 311 E. Chicago Ave., Chicago 11
International College of Dentists	Nov. 9	Dallas	H. O. Westerdahl, 4829 Minnetonka Blvd., Minneapolis
International Dental Congress of Chile (Fourth)	Nov. 16-22	Santiago, Chile	J. C. Montandon, Sociedad Odontologica de Chile, Casilla 2575, Santiago, Chile
International Dental Meeting of Paris (Thirty-second)	Nov. 24-30	Paris, France	R. A. Robert, 10, rue de l'Isly, Paris 8, France
Japan Dental Association	Mar.	Tokyo, Japan	T. Kashima, 6-4 Kudan Chiyoda-ku, Tokyo
Mid-Continent Dental Congress	Oct. 12-15	St. Louis	J. E. Brophy, 8013 Maryland Ave., Clayton 5, Mo.
Midwest Society of Periodontology	Feb. 7, 8	Chicago	G. Roth, University of Kansas City, School of Dentistry, 1108 E. Tenth St., Kansas City 6, Mo.
Montana, Ninth District Dental Society	Jan. 15-17	Billings	C. H. Betzer, 1231 N. 29th St., Billings, Mont.
National Association of Seventh Day Adventist Dentists	Nov. 7-9	Dallas	G. H. Curtis, Medical College of Evangelists, Dental School, Loma Linda, Calif.
National Board of Dental Examiners	Dec. 1, 2		G. J. Casey, 222 E. Superior St., Chicago 11
New England Dental Society	Oct. 21, 22	Boston	W. F. O'Meara, 904 Main St., Hartford, Conn.
New Orleans Dental Conference (Eleventh)	Nov. 23-26	New Orleans	A. A. Copping, 4704 Paris Ave., New Orleans
Northeastern Society or Orthodontists	Nov. 3, 4	Montreal, Canada	D. Mossberg, 36 Central Park S., New York
Odontological Federation of Central America and Panama, Second International Convention	Nov. 26-29	San Jose, Costa Rica	R. Chartier, P. O. Box 698, San Jose, Costa Rica, C.A.
Pan-American Dental Congress	Nov. 18-22	Mexico City, Mex.	R. E. Woodworth, Asociacion Dental Mexicana, Sinaloa 9, Mexico 7, D.F.
Pan American Odontological Association	Dec. 10	New York	R. H. Brodsky, 14 E. 81st St., New York
Rumanian Stomatological Congress	Dec.		N. Herman, Section de Stomatologie de la Societe des Sciences Medicales de la Republique Populaire Roumaine, Str. Progresuliu 8, Bucharest, Rumania
Southeastern Academy of Prosthodontics	Mar. 13-15	Atlanta, Ga.	H. C. Parker, Liberty Life Building, Charlotte 2, N. C.
Southern Academy of Oral Surgery	Mar. 14, 15	Atlanta, Ga.	T. E. Braly, Volunteer Bldg., Chattanooga, Tenn.
Thomas P. Hinman Dental Clinic	Mar. 15-18	Atlanta, Ga.	H. W. Wallace, 1193 The By Way, N.E., Atlanta, Ga.

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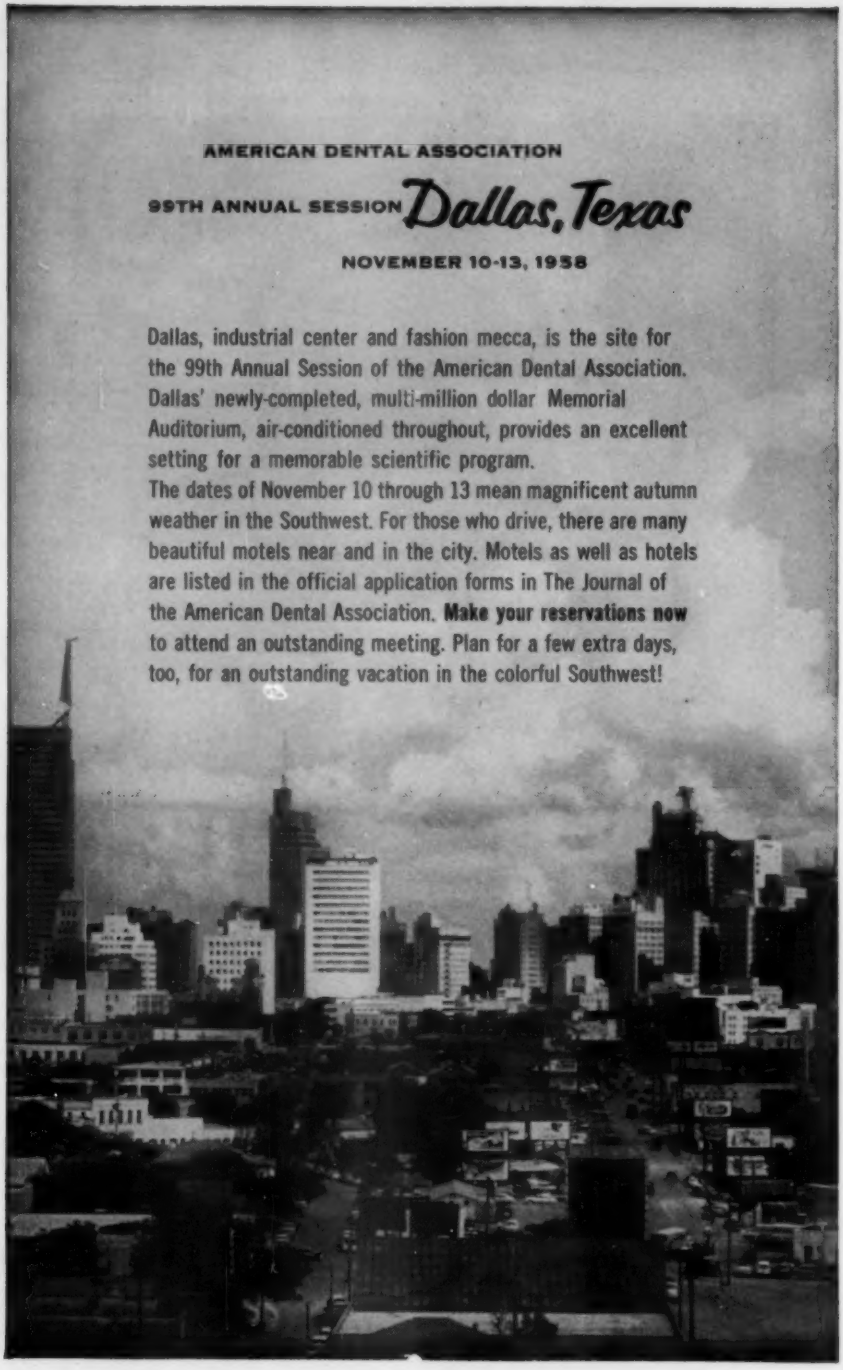
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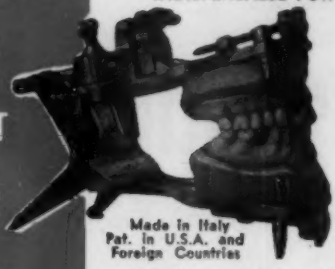

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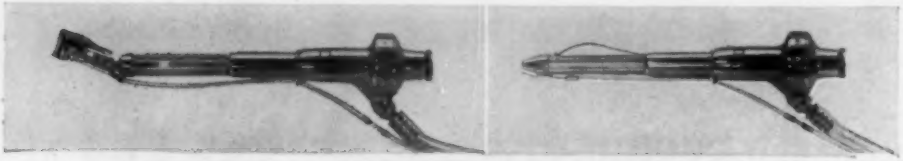

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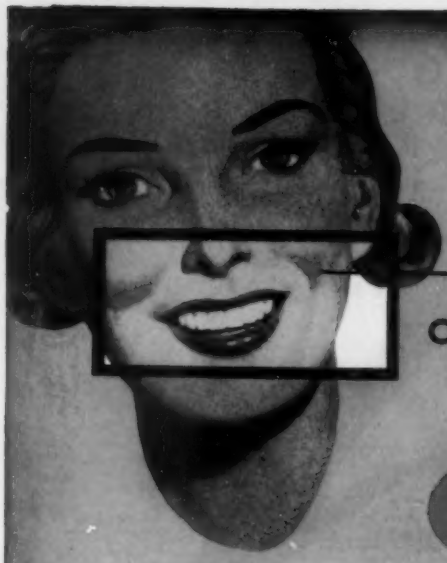

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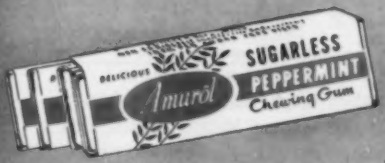

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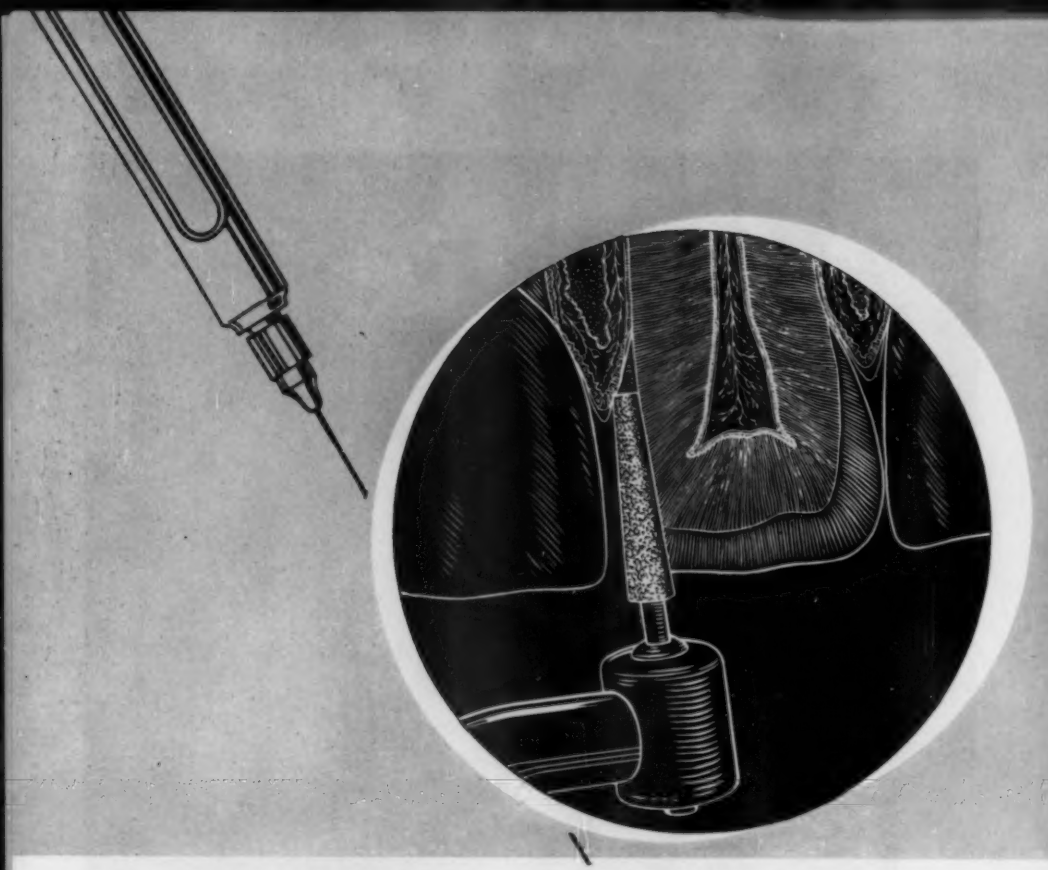

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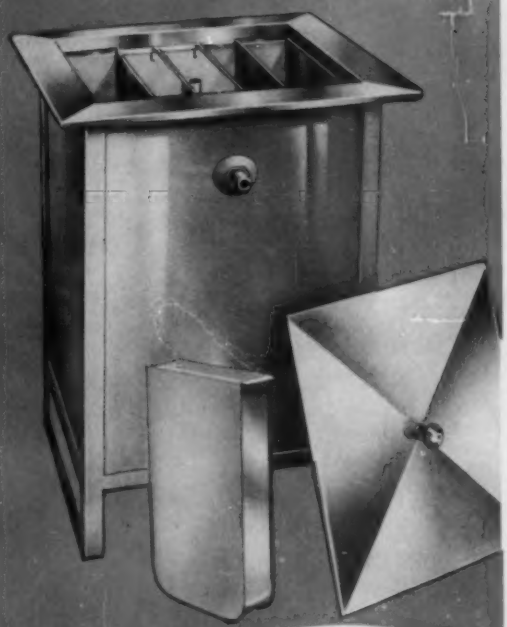

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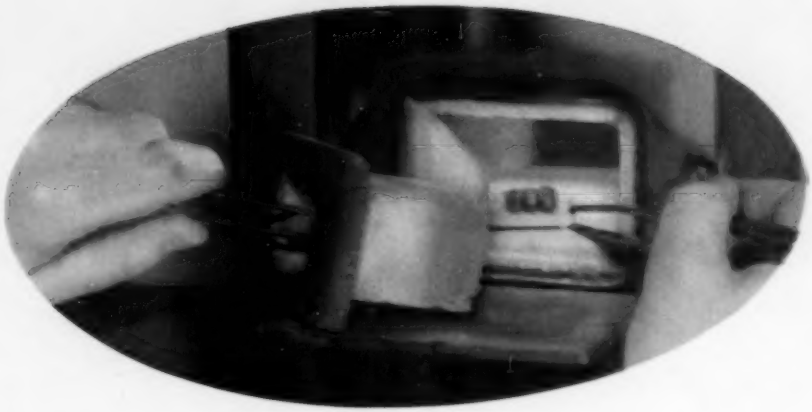

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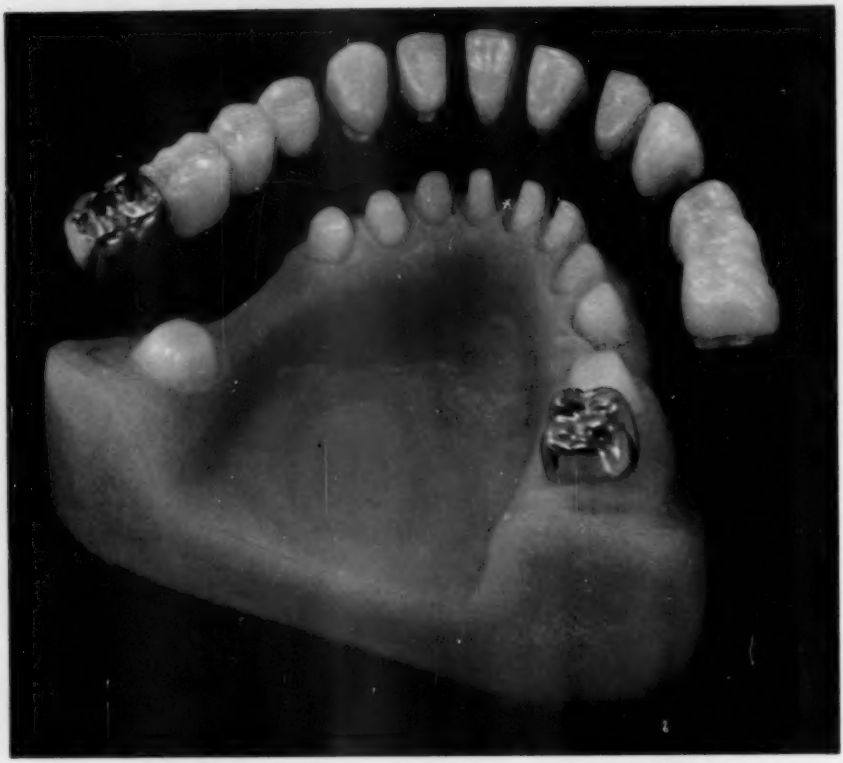

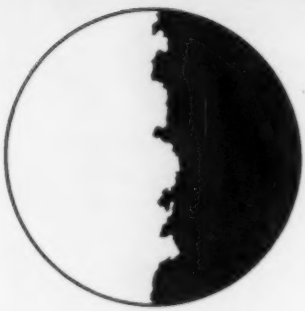

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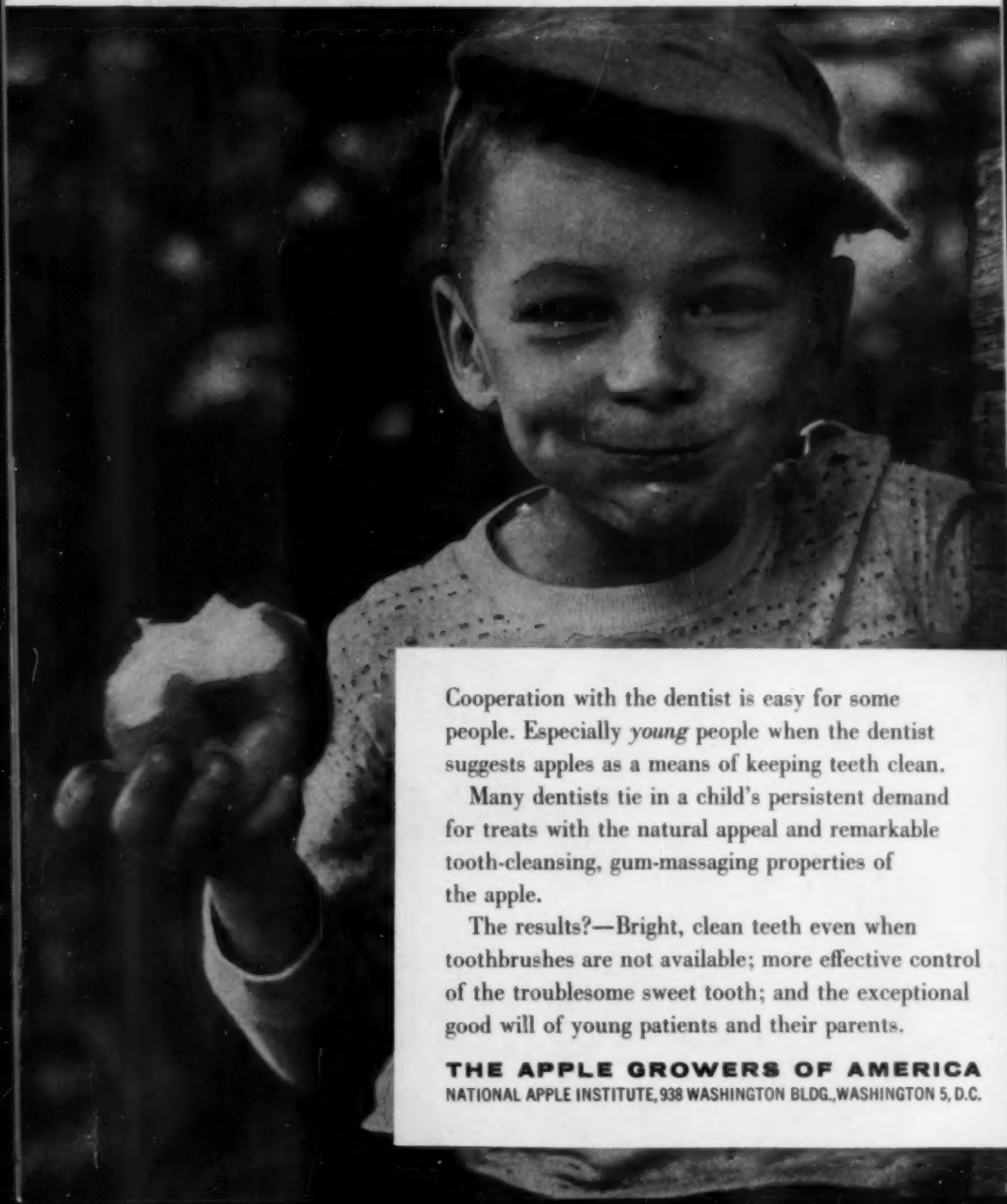
Picture of a young man

COOPERATING



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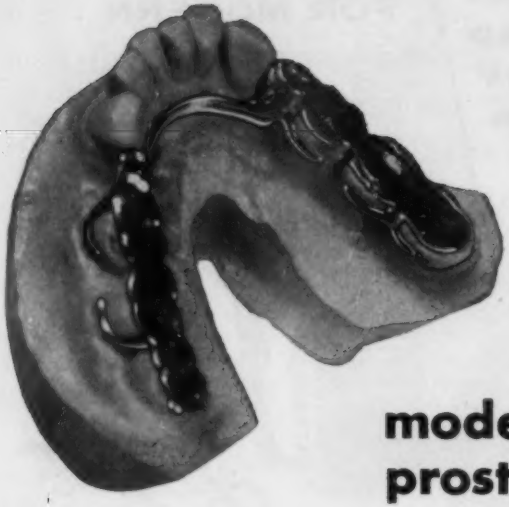

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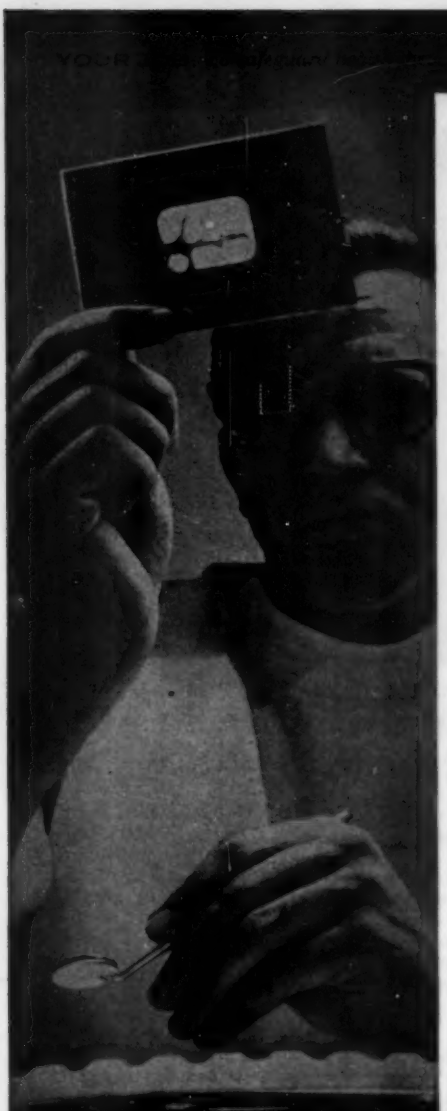

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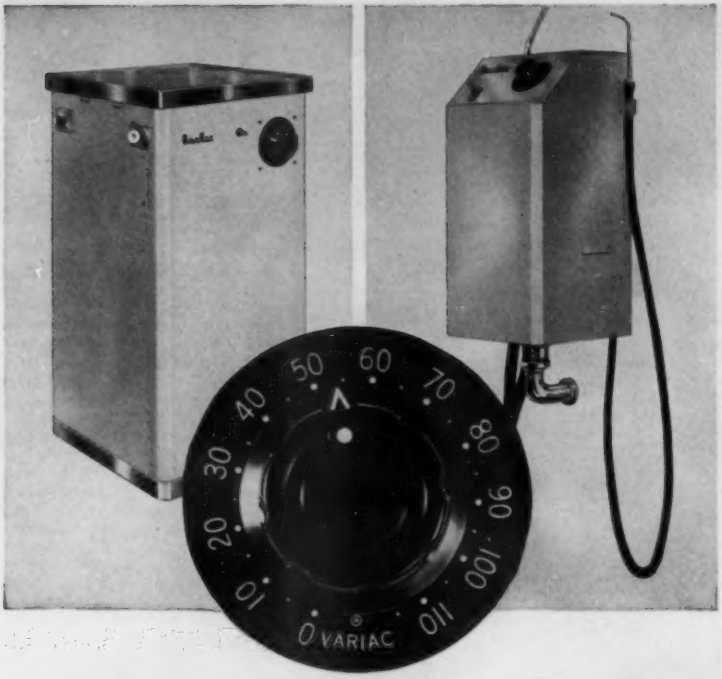

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FLORIDA — Exceptional opportunity for dentist in this beautiful, fast growing city. Offices at very low rental. Centrally located. Partially furnished. Write for full information. Address Box 444, Mount Dora, Fla.

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ILLINOIS—For sale, because of illness, old established dental practice. Small town, 20 miles southeast of Decatur. Good opportunity. Address A.D.A. Box No. 188.

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Dentist, interested in position with industry, government or civil service preferably outside continental United States. California-Illinois license, age 26, single, service obligation completed. Address A.D.A. Box No. 217.

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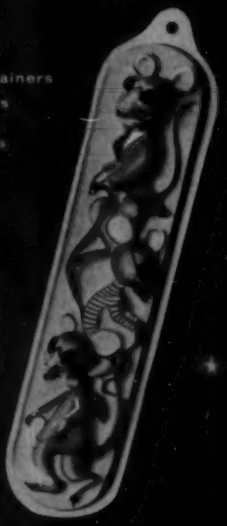

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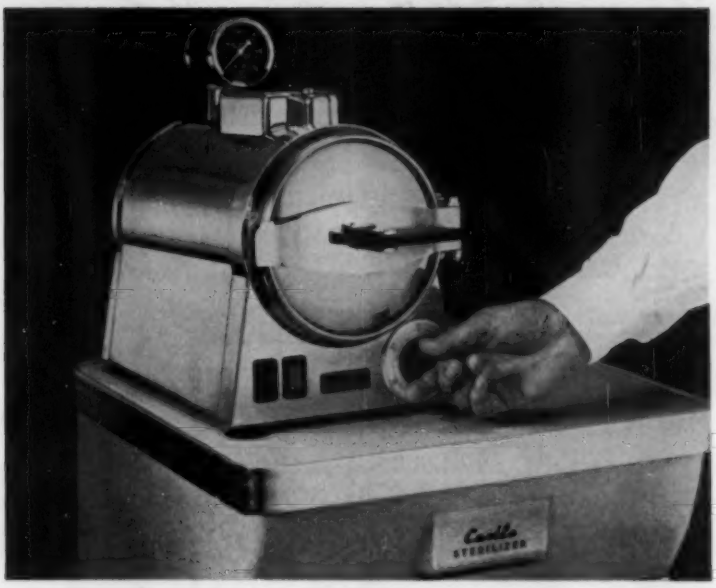

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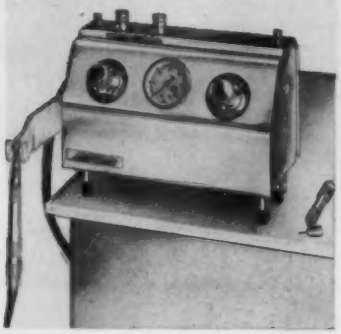

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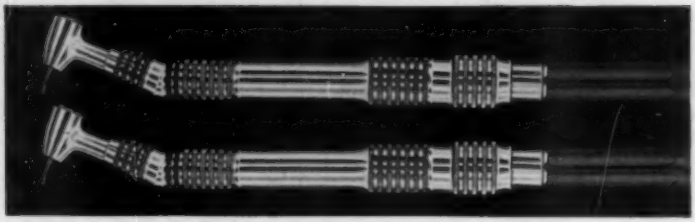

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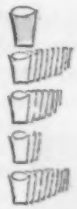

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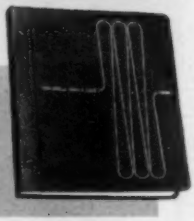

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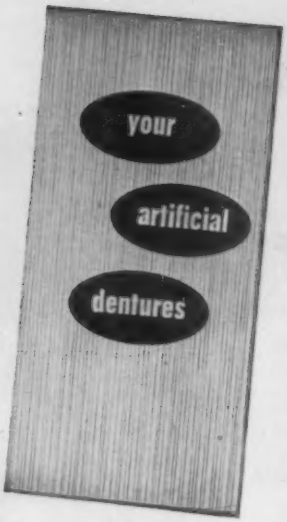

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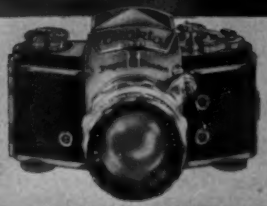

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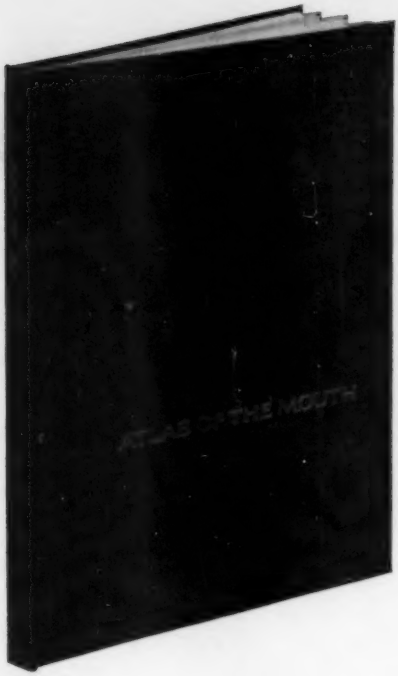

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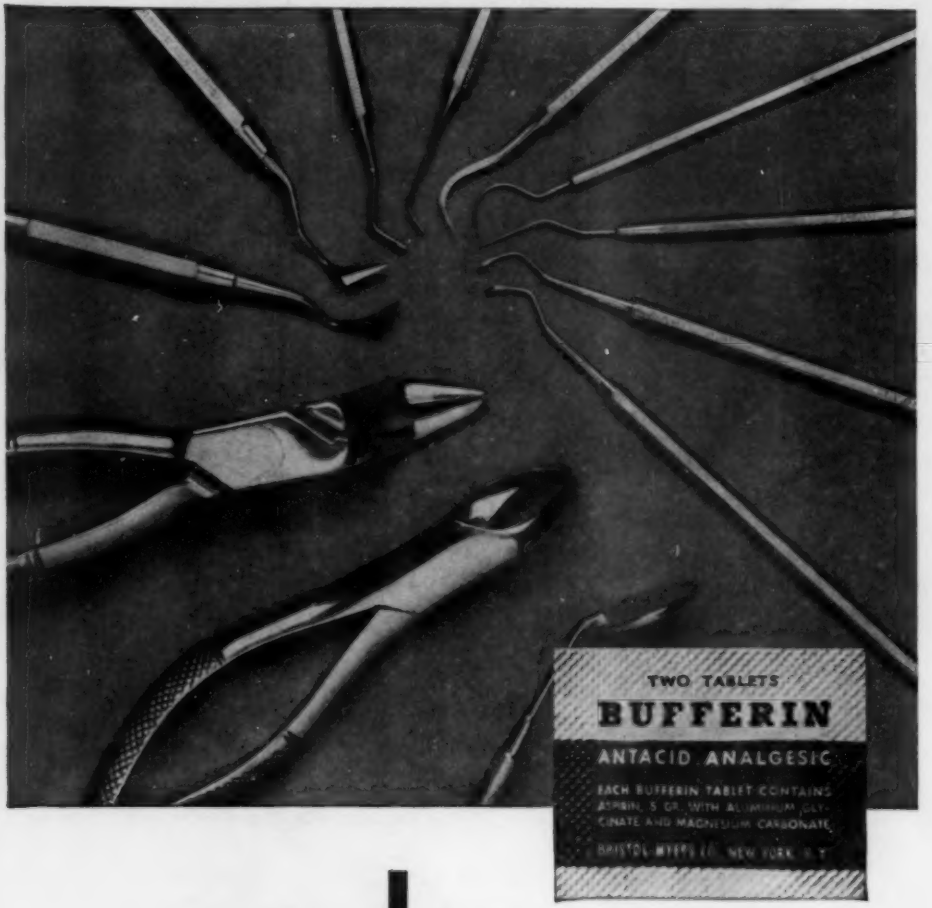

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